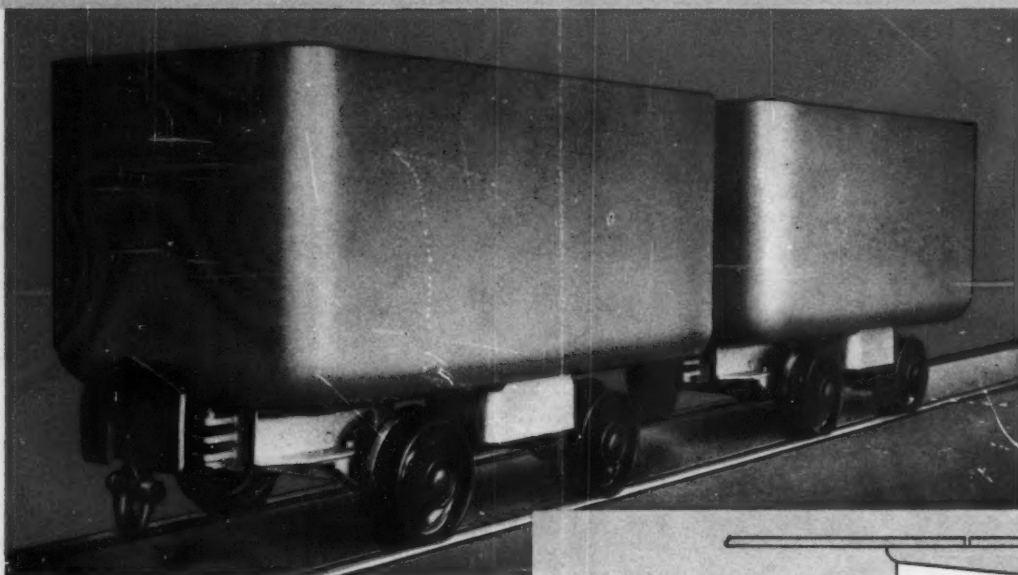


The Mining Journal

LONDON, JUNE 20, 1958

Vol. 250. No. 6409.

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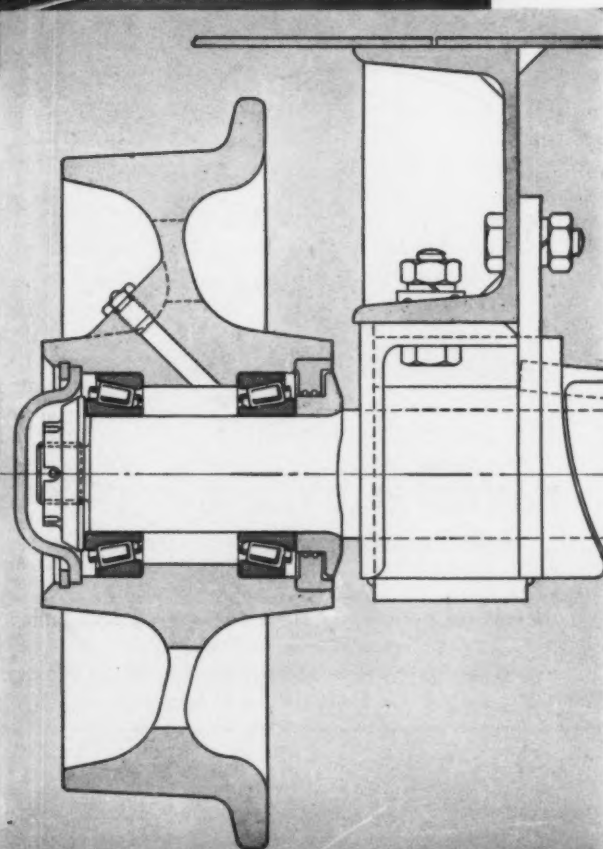
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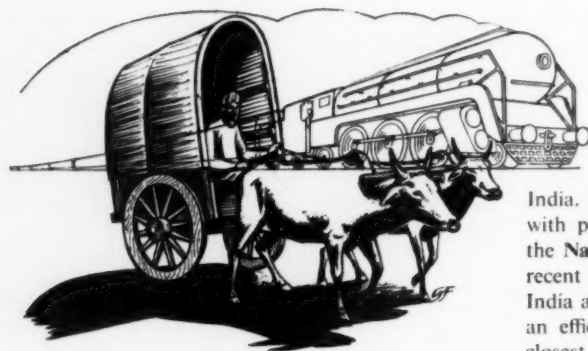


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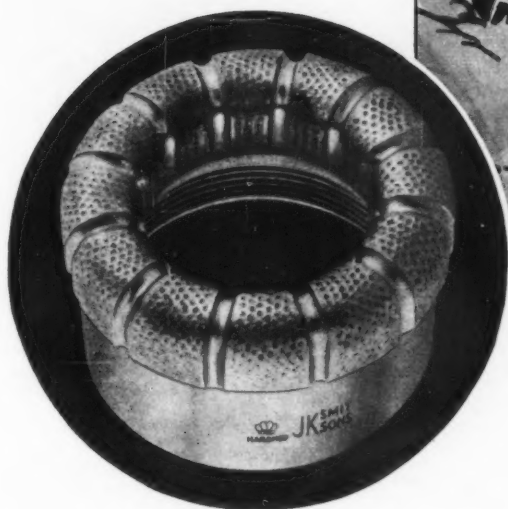
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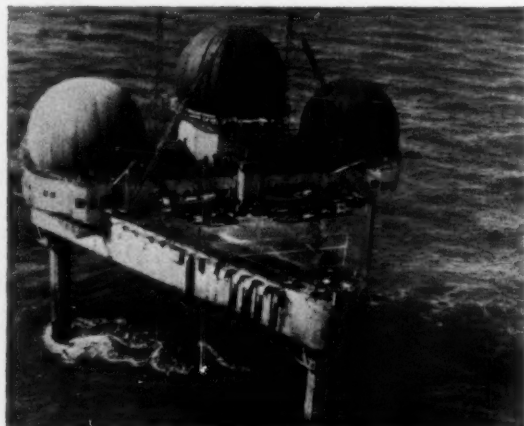
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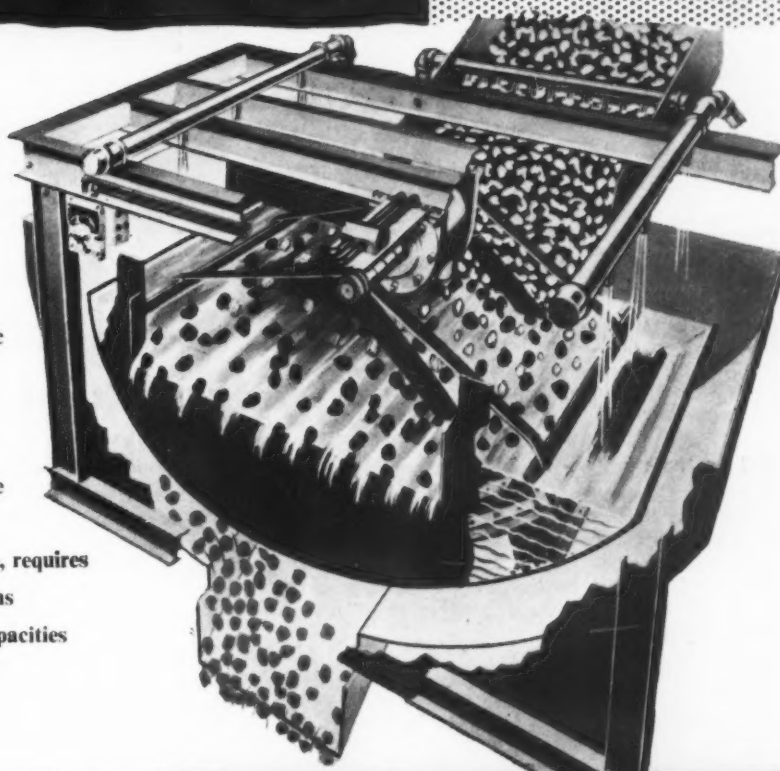
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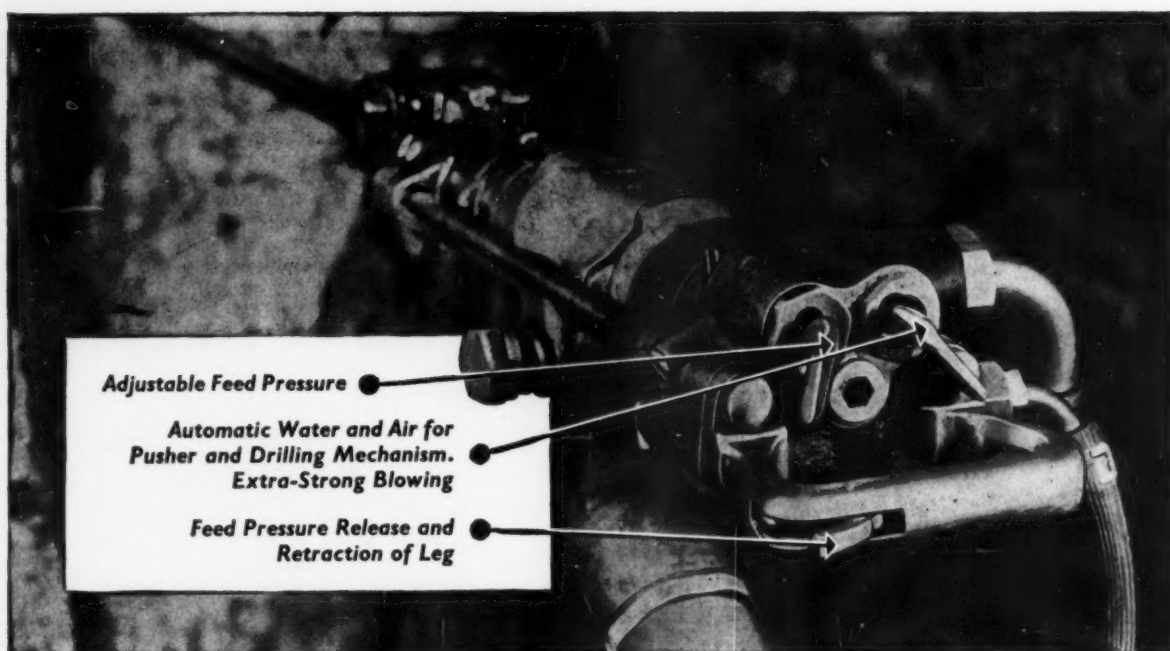
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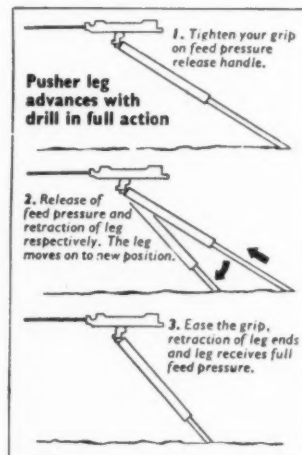
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The Mining Journal

London, June 20, 1958

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The Training of an Engineer

THE annual convention of the Association of Mining Electrical and Mechanical Engineers, which took place last week in Buxton, provided the occasion for two notable papers, both devoted to subjects somewhat broader in scope than those which we usually look for from this Association. The presidential address, delivered this year by Mr. S. Winstanley, discussed *The engineer and management*, while the Thornton Lecture on *Developments in the use of coal* was delivered by this year's medalist, Mr. A. H. A. Wynn, who since 1955 has been the Scientific Member of the National Coal Board. Extracts from Mr. Wynn's forward-looking address appear elsewhere, on page 727. His argument speaks for itself.

Mr. Winstanley's presidential address, already widely reported in the Press, raises once again the vexed problem of education for management, about which *The Mining Journal* has long been concerned, and which on the evidence of Mr. Winstanley's paper is still a long way from being satisfactorily resolved.

The burden of Mr. Winstanley's thesis is that in industry in general and, by inference, in the mining industry in particular, the qualified engineer is far more frequently failing to reach the top rungs of the promotional ladder than are those of his colleagues who have come up through other professions; and this despite the vital role which the engineer must play in the success of any industrial enterprise. Partly Mr. Winstanley attributes this state of affairs to the "poor opinion of an engineer's capabilities, other than his technical ability, prevailing in commercial circles", which is "possibly due to the presumption that an engineer has only been trained 'to make and mend' but not to manage, and that being an expert in a specialized branch of his profession does not necessarily qualify him as an organizer, manager or leader, since the qualities required for executive management are entirely different from those which have made him professionally able".

On the other hand, Mr. Winstanley also feels that the engineer himself is partly to blame for the prevailing state of affairs, by too readily accepting the prevailing position "without questioning the reason why, when he should by virtue of his training have an equal chance to attain the top-ranking positions in the ever-expanding industrial field".

Certain points stand out clearly in the perennial debate to which Mr. Winstanley has now made the latest contribution. In the first place, it is beyond dispute that the expectation of the British-trained engineer reaching boardroom level in any industry—but more particularly in the British mining industry, either at home or overseas—has hitherto been substantially less good than is that of his opposite number either in North America or Continental Europe. Secondly, this state of affairs has obtained for so long that it has to some extent engendered an inferiority complex among engineers which inhibits their natural aspirations for promotion to the most senior appointments. Thirdly, there is nothing in the technical training of the engineer which makes him inherently any less promising boardroom material than an accountant, lawyer or salesman.

The engineer has, by training, acquired precisely those processes of scientific method and thought which are basic to good management technique, but, unfortunately, what too often seems to be lacking is any formal training in applying his scientific approach to wider and often less tangible management problems. Thus, it is no uncommon experience, at senior management levels, to find that the specialist, who has been trained in the development of a scientific attitude of mind within the limits of his particular expertise, starts to think and act empirically as soon as he is confronted with a management problem.

This phenomenon is, of course, by no means limited to engineers, but there is in a sense less excuse for them, if only because to start tackling some new problem either emotionally or by trial and error is a negation of their whole training. In this connection, it is no mere coincidence that the origins of scientific management lie firmly rooted in the engineering industry and the engineering professions of America. Frederick W. Taylor once described scientific management as an attitude of mind, and there can, of course, be no doubt that it was the attitude of mind of the engineer towards management to which he referred. Certainly, managerial competence has long been regarded as part of the essential equipment of the American engineer, and in the States training in business management is a normal constituent in every engineering syllabus. Moreover, there are considerable opportunities for post-graduate courses in business management, in all of which the engineering approach is pre-eminent. In Continental Europe, where the engineering profession tends to have a closer affinity with its American counterpart than with us in Britain, a similar, if less pronounced, emphasis on the management content of an engineer's training has grown up.

Both in the States and in Europe we find a greater readiness than in Britain to put at the head of a business a man who has graduated from one of the main functions of the enterprise—design, production or sales. Equally in these countries there is a greater inclination to treat finance as a facilitating function and for the techniques of financial control to be regarded as positive tools of management rather than as precautionary devices to safeguard the board against managerial incompetence.

That a similar attitude of mind did not until recently begin to make headway in Britain was probably due in part to the financial structure of British industry, and to the effect of the Company Acts in identifying the boardroom much more closely with executive responsibility than in America where the President and his Vice-Presidents rather than the Board of Directors are the prime movers. To a very much greater extent slow progress in Britain has, however, been due to inadequate provision of formal management training. It is not that nothing has been done in this respect, but that we have awoken to this shortcoming in our industrial equipment at a considerably later date than in other European countries and perhaps twenty years' later than in the States, so that today there is a much less general awareness of the problem at boardroom level than there might otherwise have been, and far too many engineers are still reaching seniority without proper management training.

It is because of this situation that we take leave to differ from Mr. Winstanley on a point of emphasis in his challenging address. To him the all-important issue would seem to be the advancement of the professional status of the engineer and the stimulation of the engineer to a frame of mind which would refuse to accept as natural his habitual exclusion from the boardroom. To our way of thinking the need is not for a better formal status for the engineering profession, but for better facilities for training in management to be superimposed upon the engineer's tech-

nical training. It is training rather than status which can condition the young engineer's attitude to promotion, and if we can produce management-minded and managerially-competent engineers, there is little doubt that they will find their way to the top. Indeed, the indications are that this is, in fact, increasingly happening.

At this point, it is perhaps as well to restate a warning frequently made in these columns against the assumption that management training can be superimposed on technical training as part of the graduate course. Quite apart from the fact that every technical graduate course is already far too full to permit of the addition of a whole new subject, training in management cannot be undertaken *in vacuo* and, indeed, is largely a waste of time until a man has been out in industry for three or four years, and has a background of practical experience against which to relate his theoretical management instruction. It follows, therefore, that training in management must imply a post-graduate course or, preferably, as we have frequently suggested, two separate periods of post-graduate training, the first in the more elementary aspects of management at the age of perhaps 25 to 30, and a second higher management course at any appropriate age up to 40 or even 45.

Basically, this country must look for good management wherever it is to be found. It will not be found in engineering or anywhere else if Britain's technical educational facilities do not recognize the necessity, and provide fully, for formal management training. Nor will it be forthcoming unless the boardroom recognizes that management training is essentially a post-graduate study for which junior members of the staff marked out for promotion must be released fairly early in their careers.

BRITAIN'S CONTRIBUTION TO ELECTRICAL DEVELOPMENT

The mining industry has a threefold interest in electrical development. Not only is it one of the largest consumers of electrical power, but it also supplies some of the principal sources from which this form of energy is derived. The world is dependent on mining on the one hand for the coal and lignite consumed in thermal power stations and on the other for the uranium which it will require in rapidly increasing quantities for the generation of atomic power. It might be added that, apart from fuels, the electrical industry looks to mining for one of its principal raw materials, namely copper, which accounts for up to one-third of the total cost of electrical cable.

In the third place, a mining company operating in a territory which is not highly developed is also liable to become a power supply undertaking of considerable size. An outstanding example is the Union Minière, which is supplying hydro-electric power (to the extent of over 1,900,000,000 kWh.) not only to the company's own establishments in the Belgian Congo but also to the Rhodesian Copperbelt through the central switching station at Kitwe 320 miles away.

With its long record of scientific discoveries and engineering achievements, its world-wide experience of international trade and finance, and its special relationship with the Commonwealth and the Empire, Britain has played a leading role in electrical development overseas. As a nation we tend to be afflicted with a perhaps excessive reluctance to sing our own praises. There are indications, however, that we are at last beginning to outgrow this curious inclination to mute our own trumpet. Certainly there could have been no more appropriate theme for the Tenth Electrical Power Convention, held at Brighton this week, than "Electricity and World Progress :

Britain's Contribution"—a contribution, we might add, in which the mining industry can justly claim to have played no small part.

Typical examples are Alcan's vast Kitimat project in British Columbia and the Kariba hydro-electric scheme. True, in the former case, the power is being used almost entirely by Alcan itself, but the Kariba project will play a key part in the economic development of the Central African Federation, but without copper mining this vast project could scarcely have been contemplated for many years to come, nor indeed could there have been any potential demand in the foreseeable future for power on such a scale. Moreover, £20,000,000 out of the £80,750,000 borrowed by the Federal Government to finance Kariba came from the four chief Northern Rhodesian copper mining companies and a further £4,000,000 from Chartered. Financial aid is, of course, as necessary for electrical development projects as technical assistance and the provision of plant and equipment.

The electrical industry in Britain has made strenuous efforts to expand its production to satisfy the many and increasing demands which it has had to meet. In a paper entitled, "Britain's Part in Electrical Development Overseas", Harold J. Beard analyses our position in the export markets. Over the six-year period 1952-57 there has been an overall increase in world electrical exports of 54 per cent. Western Germany with 183 per cent has had the largest increase, while the U.S. increase of 47 per cent is not far below the average. Britain's increase is 28 per cent.

It is further shown that the proportion of the total electrical production which has been exported has dropped slightly during the last six years in all three countries. On the other hand, the total electrical production in Western Germany has increased threefold over the period compared with doubling in the U.S. and a 58 per cent increase in Britain.

The world-wide scope of the British electrical equipment industry, as well as the range and diversity of its products, are indicated in the paper by examples of recent export orders. As might be expected, these relate mainly to major hydro, nuclear or conventional power plants. Among them, however, not the least interesting, is the supply of diesel-driven generating plant, substations and portable electrical equipment for the electrification of diamond mining operations over a large part of Angola.

Electrical equipment accounts for a high proportion of our total mining machinery exports and the problems of our electrical manufacturers are thus of close concern to the mining industry. It is interesting to see how far experience in the mining machinery field is being reflected in a wider context, presumably again for the reason that production capacity cannot be expanded as rapidly as in Western Germany and the United States.

It is the major contracts which provide the foundation on which exports of other electrical equipment can be built. For this reason competition to obtain the larger orders is most fierce, especially if the project has any international publicity or may lead to repeat orders for similar plant. A point made by Beard is the importance of encouraging purchasers to call for tenders based on clear and comprehensive specifications, so that there is no confusion or misunderstanding about the scope of the contract and the extent of the equipment to be included. This would appear to be particularly important when dealing with special requirements such as those of mines or metal refineries.

Referring to the charges (which have been discussed in this journal from time to time) that the after-sales service provided by British manufacturers sometimes compares unfavourably with that offered by other countries, the view is expressed that the electrical industry fully recognizes the

importance of providing stocks of spares and adequate maintenance facilities. The provision of service engineers to give advice on defects or on problems arising during operation presents greater difficulties. This point is continually under review by firms with major interests overseas, but the paper points out that, under present-day conditions, it is not always easy to release qualified engineers, who continue to be in great demand at home. In many cases this problem has been tackled by bringing local engineers to this country for works training.

In common with other exporters, electrical equipment manufacturers are faced with the growth of local industry in countries which were formerly among their best markets. In this connection, Sir George Nelson points out that, although local industrialization might stop our exports of certain goods, the usual effect is to stimulate the exports of other goods. It is, of course, evident that the pattern of our exports—including mining machinery and equipment—must be adjusted to fit in with the changing requirements. As an overseas country becomes more highly industrialized there will be an increasing demand not only for the specialized components which we can offer, but also for our skill and experience and this should lead to growing markets for British consultancy. "Know-how" is a commodity which U.K. manufacturers are particularly well qualified to supply.

BULGARIAN MINING PLANT FOR CHINA

An indication of the astonishing advance of industrial development in the Bulgarian People's Republic is furnished by a report in *Otechestven Front*, official daily newspaper of the Bulgarian "Fatherland Front" and Government, of March 28, that Bulgaria has secured a contract to supply and instal the complete plant for two non-ferrous mining enterprises in China.

The first of these, for which detailed plans have already been completed by the appropriate government organization, known as "Minproekt", is for Si-din, in the Province of Kwangsi, in South China, where two underground workings and one open-cast working for the mining of lead-zinc are to be opened up, and a flotation plant with a daily intake capacity of 400 tons of ore and a daily output of 15-20 tons of lead concentrate and 80-90 tons of zinc concentrate is to be established. The provision of housing for the mine personnel and of all requisite power and other public services is included in the contract.

The second contract, upon the detailed planning of which "Minproekt" is now engaged, is for a similar complex two and a half times as large, where the flotation plant will have a daily intake capacity of 1,000 tons of ore, in the Province of Liao-ning, in North-East China. The report states, with not unjustified pride, that this larger project presents no difficulty to "Minproekt", since that organization has already established a flotation plant to process 6,000 tons of ore daily—presumably that established in the Rodozem mining basin in the Rhodope mountains, in Southern Bulgaria, which was visited, incidentally, by a Chinese Technological Mission, last year.

The report specifies by name the various State-owned industrial enterprises in Bulgaria which are to supply the plant and equipment necessary for the execution of these two contracts—the "Stalin" works at Dimitrovo (formerly Pernik), the "Chervena Zvezda" works in the village of Debelelets, near Ternovo, the machine repair shop at the mining centre of Kerdjali, the "Sila" works at Yamvol, and the "Nikola Vaptsarov" works in Pleven.

CANADIAN ZINC—I

Zinc in Canada

OF the zinc-producing countries, Canada is second largest, both in the output of refined zinc and in overall production, which includes zinc contained in ore concentrates exported to other countries. In the dollar value of metals produced from Canadian ores in 1957, zinc took fifth place at \$99,000,000, being exceeded only by copper, iron, gold and uranium. In volume (355,000 tons of mine production in 1957) zinc is the leading metal of the non-ferrous group. Slab zinc production amounted last year to 219,000 tons. About seven-eighths of the Canadian zinc output is exported, mainly to the United States and the United Kingdom.

Occurrences of zinc in Canada are widespread and ore has been found in commercial quantities in 8 of the 10 provinces, as well as in the Yukon and North-west Territories. Since zinc occurs in the form of a sulphide in association with sulphides of other metals, principally those of lead and copper, its recovery in most cases is integrally connected with the recovery of these other metals. There are very few instances of ore having been mined in Canada for zinc alone. For the most part, the principal zinc sulphide, sphalerite, occurs with the lead sulphide, galena, or with chalcopryrite, one of the principal copper minerals. In some deposits sphalerite, galena and chalcopryrite are all present in zinc-bearing ores, silver being more usually associated with the lead-zinc type of ore, while gold often occurs with copper mineralization.

Refined zinc is produced at Trail, British Columbia, by the Consolidated Mining and Smelting Co. of Canada Ltd. (Cominco) and at Flin Flon, Manitoba, by Hudson Bay Mining and Smelting Co. Ltd. The greater part of the zinc-bearing ores mined in British Columbia and Yukon is treated at the Trail plant, which has an annual output capacity of 190,000 tons. The Flin Flon plant with an annual capacity of 70,000 tons, treats zinc concentrate produced from Hudson Bay's copper-zinc deposit, which lies on the Manitoba-Saskatchewan boundary. A very high grade of electrolytic zinc is made at both Trail and Flin Flon.

Historical Summary

Canadian zinc production became established with the inauguration of the Cominco electrolytic plant at Trail in 1916, with an initial rated output capacity of 60 tons a day. As the supply and grade of zinc concentrates improved, the plant was successively enlarged and expanded until in 1952 it attained a rated daily capacity of 520 tons of refined zinc.

Operation of the Flin Flon zinc plant began in September, 1930, with a rated daily capacity of 70 tons of refined zinc. From time to time the plant's capacity was increased until it reached the present rated output of 190 tons a day.

The development of selective flotation in the years 1915 to 1925 resulted in the principal advance in the recovery of zinc from complex ores. In this process the bulk of the copper or lead in the ore is separated, leaving the zinc, which is then concentrated and separated from the remaining iron sulphides or waste material. Zinc concentrates usually average 50 to 55 per cent zinc, but may vary between 45 and 60 p.c. zinc, depending on the ore.

Another important advance in the recovery of zinc in Canada involved the treatment of zinc plant residues.

The difficulties at present being experienced by the zinc industry enhance the interest of a new publication, "Zinc in Canada with Comments on World Conditions", by R. E. Neelands and D. B. Fraser, Mineral Resources Division, Department of Mines and Technical Surveys, Mines Branch (Memorandum Series No. 137, price 50 c.). This is the first of two articles based on the Department's timely survey of one of Canada's major industries.

These residues, containing up to 25 per cent zinc, result from the purification of the solution preparatory to electrolytic refining. The practice at Trail is to add the residues to the lead blast furnace charge; in the smelting operation the zinc goes into the slag, from which a large percentage is recovered as zinc oxide by fuming. The first slag fuming furnace at Trail was constructed in 1930 and a second unit, completed in 1949, permitted the treatment of a large stock of accumulated residues. At the Flin Flon plant residues from the copper smelter reverberatory furnace were first treated in 1951, following the completion of a zinc fuming plant to treat slag from the reverberatory furnace for the recovery of zinc oxide fume. At both Trail and Flin Flon zinc is recovered from oxide fume at the respective electrolytic plants.

Operations in the Provinces

British Columbia's silver-lead-zinc deposits have been mined steadily for over 60 years. In periods of high prices, the number of individual operations at times exceeded several hundred, ranging from medium-sized mines to small leasing operations employing only a few men. During periods when prices were low, the number of smaller operators was materially reduced. Beginning early in the century, most of the mines shipped their silver-lead ore to Trail or to other lead smelters then operating in B.C. After completion of the Trail plant, the smaller mines shipped their concentrates also to Trail and this practice continued until 1952, when it reached a peak of over 50,000 tons of contained zinc. In 1953, custom shipments to Trail dropped substantially and exports of concentrates to plants in the north-western States increased. This trend continued through 1956.

There was no production of zinc in Manitoba or Saskatchewan before 1930, when Hudson Bay Mining and Smelting Co.'s zinc plant came into operation. In addition to its own ores from the Flin Flon deposit, the company treated concentrates produced by Sherritt Gordon Mines Ltd. from its copper-zinc deposits at Sherridon, Manitoba, in the period 1942-1951, and by Cuprus Mines Ltd., a copper-zinc producer near Flin Flon, in 1948-1954. Operations at both these mines ceased owing to exhaustion of the ore deposits. Hudson Bay started production from its Schist Lake copper-zinc mine in 1954 and expects a small recovery of zinc from its Coronation mine, which is now under development.

Production of zinc in Ontario has been notably low, having regard to the magnitude of the total metal output of the province. During World War II a former producer, the Geneva Lake zinc-lead mine in the Sudbury area was again brought into production; between 1941 and 1944 it supplied over 5,000 tons of contained lead. Jardun Mines

Ltd. reopened several old mines near Sault Ste. Marie and began producing zinc and lead concentrates in 1954.

The Tetreault mine, 60 miles west of Quebec City, was Quebec's first important zinc producer and was operated intermittently from 1913 until 1955 for a total output of about 118,000 tons of contained zinc. During the past 25 years the development of the large zinc, copper-zinc, and lead-zinc deposits in Abitibi county, north-western Quebec, has raised the province's production of zinc concentrate to major proportions. Several mines in southern Quebec have increased the output.

Lead and zinc occur in a number of deposits in New Brunswick and Nova Scotia. Production of zinc concentrate began at the Stirling mine on Cape Breton Island in 1930; operations were suspended in 1938 but were resumed in 1952 and production was maintained until 1956 when ore was reported to be exhausted. In New Brunswick the first production of zinc concentrate came from Keymet mines near Bathurst in 1954. This property was closed early in 1956 when reserves were exhausted.

In 1952 and 1953, two very large deposits of iron sulphides containing zinc and lead were outlined near Bathurst, New Brunswick. The development of these and of a similar type of deposit discovered northwest of New-castle in 1954 is under way. In northern Cape Breton island, scattered zinc occurrences have been found over a wide area, exploration being commenced in 1953 with promising results.

Newfoundland's only zinc deposits of importance are those of Buchans Mining Co. Ltd. in the central part of the island. Production here began in 1928 and has been continuous. The concentrates have been exported to the United States or Europe.

In the Mayo area, about the centre of the Yukon territory, high-grade silver-lead-zinc occurrences were discovered in 1906. Shipments of silver-lead ore began in 1921, but owing to high transportation costs zinc concentrate output did not begin until 1949. Several isolated zinc-lead deposits of considerable extent have been located in recent years.

Third International Coal Preparation Congress

THE third Coal Preparation Congress was arranged to be held in Belgium in order to coincide with the Brussels Exhibition and this has resulted in a large registration from coal preparation engineers throughout the world.

The Congress opens at Liege on Monday, June 23, and altogether 65 technical papers are being presented for discussion. The theme is the preparation of small coal and most of the papers deal with this. However, there are a number of general papers and the whole field of coal preparation is covered to some extent.

Grouping of Papers

Coal preparation in relation to its use in coke ovens. Six papers describe existing practice in various countries and discuss the requirements of coke ovens. Naturally these vary considerably in the different countries and it will be interesting to see whether some standard procedure can be suggested.

Coal preparation in relation to its use in power stations. Five papers describe national practices. It is pointed out by Jenkins and Booth (G.B.) that in most countries the electricity industry is integrated with the coal industry so that mutual arrangements can be made for coal supplies. In the U.K. this is not the case and the National Coal Board sells to the power industry on a competitive basis. This causes problems, particularly in the disposal of high ash middlings. In France, for example, a substantial amount of power is produced from the combustion of these middlings and this has an important influence on practice.

Preparation of raw coal before washing. The eight papers in this group deal mostly with partial preparation and screening. One paper on "The reduction of moisture in washed coal" by Hall and Macpherson (G.B.) appears to have been included in the wrong group and it is hoped that the discussion on this important paper will not be limited because of this. The authors describe various methods of moisture reduction, giving their experiences on each and it is probable that some European operators will be able to give their opinions on this subject, thermal drying being extensively used throughout Europe.

Washing of small coal. This group of nine papers includes descriptions of several new processes but some of

the papers are not yet available. A Russian paper describes a method of reduction of sulphur content of coking coal by crushing to 3 mm. and separating in a centrifuge with solution of common salt (a waste product from the chemical industry) as medium. Results given are excellent and it is stated that an industrial plant is now being erected. No cost figures are given and it is hoped that more information will be available at the congress. Another Russian paper describes experimental work on the use of reagents in cyclone separators. It is shown that water with 30-100 gms./ton of paraffin can be used for separation of fine coal in cyclones, with results comparable to those obtained in dense media cyclones but with naturally much reduced cost. Further information on this will be awaited with great interest.

Slurry Treatment, including Flotation, Water Clarification, etc. This is a comprehensive group of 16 papers, five of which deal with flotation. The remainder discuss thickening, filtration, drying and methods of handling and disposing of tailings. A Japanese paper entitled, "Ultrasonic Treatment of Slurry" is awaited with interest.

Control and Miscellaneous

The control and miscellaneous group has 12 papers, mostly on practical aspects of preparation but as usual including two theoretical papers on sampling. A Dutch paper describes an apparatus for continuous determination of ash content of coal and it is claimed that consistent results close to those obtained by analysis, have been obtained over several months of testing. A Russian paper, not yet available is entitled, "Use of radioactive isotopes and radiations in coal preparation research and practice".

Trends in methods and processes. Nine papers describe the trends in seven countries and the reasons for the particular methods in use are in most cases explained. It is interesting to see the marked differences in these countries which are usually attributable to economic conditions.

Three of the afternoons during the week are given to visits to Belgian and Dutch collieries and a programme of visits to collieries in Belgium, France, Germany and England has been arranged for the week ending July 4.

An account of the congress by our own correspondent will be published in due course.

THE remarkable post-war growth in the industrial production of the highly developed countries has been accompanied by far-reaching technological changes. This has resulted in an intense demand for minerals; not only those which have been traditionally produced in Latin America but also light metals, minerals for the chemical industry, metals for steel alloys, and those used in the atomic industries.

Yet Latin American mining has shown little response to this incentive. In its traditional branches—copper, lead, zinc, and tin—increases have been relatively small and there have been virtually no increases at all in the mining of other minerals for which there is a strong demand.

Viewing the post-war period as a whole, if the Latin American mining industry had maintained the same share of world production as it had in 1945, and assuming that there had been no change in the rate of increase in the value of world production during that period, the estimated value of Latin American mineral production would have been about \$U.S.3,000,000,000 greater at 1953 prices.

Since 1945 copper, lead, zinc and tin have accounted for between 50 and 60 per cent of the value of total production in Latin America, excluding fuels.

Post-war Mining Developments in Latin America

The dominant influence of one or two commodities in the structure of each country's mining industries is perhaps the most outstanding characteristic of Latin American production. Tin represents more than half of the value of Bolivia's mine and smelter production; the ferrous metals dominate the mining industries of Brazil and Cuba; copper, those of Chile; lead and zinc, those of Mexico and Peru (excluding fuels); and precious metals, those of a number of the smaller countries. Mineral fuels predominate in Argentina, Colombia, Ecuador and Venezuela, but in none of the other countries—with the exception of Peru—do they represent a significant portion of the total value of production.

Another striking fact is the relative unimportance of ferrous metals. In 1950, only in Bolivia, Brazil, Chile, and Cuba did the ratio of ferrous metals to total production

PRODUCTION OF MINERALS AND METALS, BY COUNTRIES
1945, 1950 and 1955

Country	1945	1950	1955
Argentina	39,180	74,013	113,709
Bolivia	69,556	80,143	98,061
Brazil	47,868	78,947	133,112
Chile	174,134	280,217	490,240
Colombia	50,415	107,772	155,122
Costa Rica	127	37	35
Cuba	14,548	12,741	31,414
Dominican Republic	74	81	223
Ecuador	6,789	10,838	11,212
El Salvador	751	1,592	561
Guatemala	89	1,102	3,358
Haiti	25	101	138
Honduras	2,167	3,983	2,207
Mexico	185,493	397,584	546,306
Nicaragua	7,367	8,237	8,237
Panama	8	61	42
Paraguay	—	—	5
Peru	52,951	104,589	179,171
Uruguay	29	17	44
Venezuela	398,601	1,379,089	2,287,975
TOTAL	1,050,172	2,541,144	4,072,745

exceed 5 per cent. The light metals (aluminium, magnesium, titanium) are of negligible importance in Latin America, both in mining and smelting, despite the great world demand.

Production of antimony, mercury, cadmium, bismuth and beryllium is small. Only Mexico recorded any significant increase in this group of metals in recent years. Elsewhere, these metals as a whole have been losing ground despite increasingly favourable prices.

Finally, it is noteworthy that in many countries—most spectacularly in Brazil, Colombia, Mexico and Peru—the precious metals have been declining in relation to other minerals. There have been no significant increases since the war; nevertheless they still continue to account for a large fraction of the region's mining economy.

In Latin America, as a whole, the income derived from mining, including fuels, showed an annual rate of growth of 5.9 per cent, which exceeds by nearly 1 per cent that of all other sectors of economic activity together. But, if mineral fuels are excluded, the value of mining production shows an annual increase of only 2.3 per cent, which is practically half that of Latin America's gross domestic production (5 per cent).

Mineral Fuels

This group of commodities constitutes the greater part of Latin America's output of non-agricultural raw materials. Mineral fuels comprise more than 80 per cent of the



This article is based on a United Nations Publication, "Economic Survey of Latin America, 1956" (price 18s. sterling; \$U.S.2.50; Sw.fr. 10.50), in which due prominence is accorded to the post-war development of the mining and metal industries. Though the period covered does not extend to 1957, the statistics given in the survey underline the vulnerability of the Latin American economy to the fall in base metal and mineral prices.

Alongside, at right, a Caterpillar D6 with 6A dozer constructing a road to expedite sulphur production in Mexico

Below, at right, the Cuiete quarry, Minas Gerais, Brazil. The Minas Gerais Triangle constitutes an important source of Brazilian mineral supply

Below, at left on opposite page, a Marion shovel in iron mining operations at Orinoco, Venezuela



value of minerals and metals output in Argentina, Colombia, Ecuador and Venezuela, and roughly 50 per cent in Mexico and 30 per cent in Peru. Latin American production of mineral fuels represents approximately 10 per cent of the world total, Venezuela accounting for nearly four-fifths of Latin American output.

In the United States, natural gas and coal account for more than half the consumption of mineral fuels; in some industrialized countries of Western Europe, the share of coal is much higher. By contrast, in Latin America petroleum represents over 97 per cent of the total, but in spite of this high percentage it continues to replace coal as a source of heat and of electrical energy. Production of coal has increased only by 2.8 per cent per year in Latin America during the post-war period.

Iron

Production of iron-ore is limited to Argentina, Brazil, Chile, Colombia, Cuba, Mexico, Peru and Venezuela. Of these countries, only Cuba has not yet developed its own metallurgical industry based on iron-ore. Only in Brazil, Chile, Colombia and Peru does the value of iron-ore and pig-iron exceed 5 per cent of the total value of minerals and metals produced.

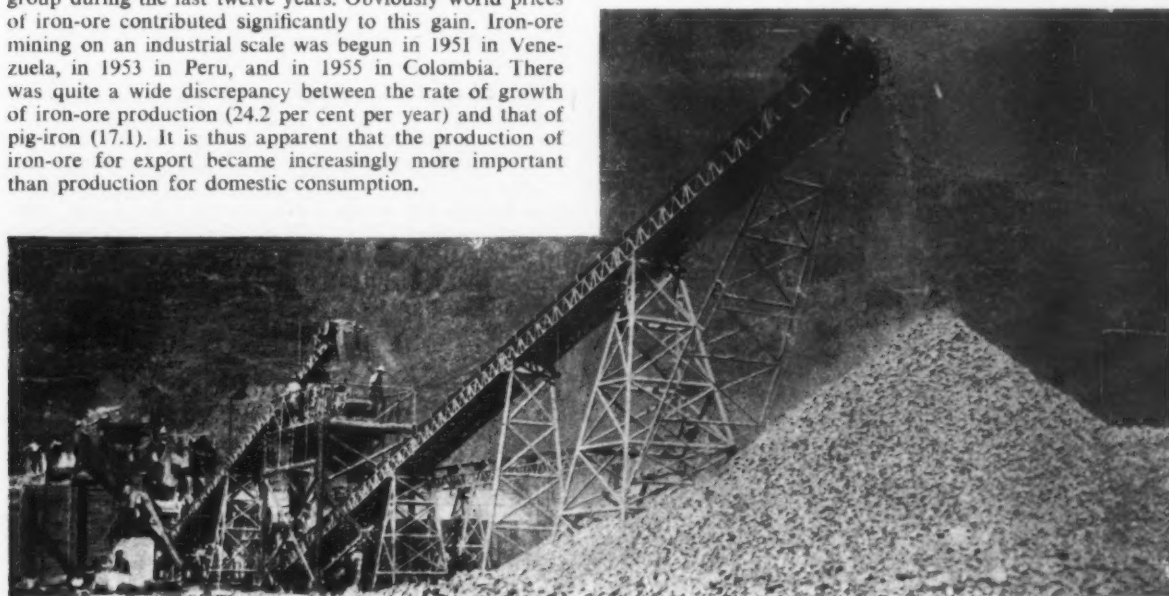
Iron-ore and pig-iron registered by far the highest rate of growth (18.1 per cent per year) of any commodity group during the last twelve years. Obviously world prices of iron-ore contributed significantly to this gain. Iron-ore mining on an industrial scale was begun in 1951 in Venezuela, in 1953 in Peru, and in 1955 in Colombia. There was quite a wide discrepancy between the rate of growth of iron-ore production (24.2 per cent per year) and that of pig-iron (17.1). It is thus apparent that the production of iron-ore for export became increasingly more important than production for domestic consumption.

The existence of a domestic iron-mining industry has constituted one of the essential bases for the development of a domestic iron and steel industry in some countries, such as Brazil and Chile and, more recently, Peru and Venezuela. In Argentina, consumption has been outstripping domestic production. The traditional sources of supply in the province of Jujuy offer sufficient resources for the expansion of steelmaking in the northern zone, but if the large coastal plants are used, it is probable that the Sierra Grande deposits in Rio Negro province will be worked. In Mexico and Colombia, iron-ore has been mined primarily to supply the domestic market.

Alloying Metals

Over the period 1945-55, prices increased more rapidly for this group of minerals than for any other section of Latin American production except copper. Yet Latin American production did not increase until 1950, and virtually the entire increase—73 per cent—was confined to the period 1951-55. Except in the case of tungsten, none of the alloying metals equals as much as 1 per cent of the Latin American economy. Yet these metals are quite important in the mining economies of Bolivia, Brazil and Cuba.

In 1956, a series of significant advances was made in



mining Latin America's numerous deposits of alloying metals. In Brazil, it was announced that mining had commenced in the large manganese deposit at Cerro do Navio, in the territory of Amapá, from which between 500,000 and 600,000 tonnes would be extracted in 1957. In addition, work continued at the Morro do Urucum iron and manganese mine at Matto Grosso. Initial plans call for extraction of 50,000 tonnes per year of manganese ore. A third manganese deposit was opened during 1956 in the Amazon region, from which several thousand tonnes of ore have been exported.

A rich manganese deposit in the State of Jalisco, Mexico, was also opened during 1956, while large-scale exports from Venezuela commenced, due to the opening of the Upata mines. Plans were under way in the latter country to set up a plant for the production of ferro-manganese.

Latin American production of nickel is centred in Cuba, which in 1956 produced 14,061 tonnes.

Copper, Lead, Zinc

The copper industry is one of Latin America's largest sources of foreign currency. In 1955, it accounted for 66 per cent of Chile's visible exports, 11 per cent of those of Peru, and 9 per cent of those of Mexico. In Chile and Mexico, the two largest producers, production fell during the post-war period by an average of 0.9 and 1.0 per cent per year respectively. Only in Peru did production increase (3.6 per cent annually). In Latin America as a whole, production declined by 0.5 per cent per year. World copper production rose by 4.7 per cent annually during this period, in response to rapidly climbing prices, but Latin America's share fell from 29 p.c. in 1945 to 17 p.c. in 1955.

Latin American production of copper increased in 1956 by more than 14 per cent over the previous year's level. The increase came mainly from Chile, which exceeded the 1955 figures by over 11 per cent. Prospecting and development of a number of new copper deposits continued. The most important of these in 1956 were the Toquepala project in Peru and the El Salvador mine in Chile.

An ambitious new plan to develop copper mining by small and medium-sized operators was announced by the Caja de Credito Minero and the Empresa Nacional de Fundiciones. The capacity of the Paipote smelter will be doubled to 260,000 tonnes of charge a year. At the same time, the Punta del Cobre mill situated near the Paipote smelter will increase its capacity by 1,000 tonnes of ore per month. Finally, a new smelter and electrolytic refinery, to serve the central zone of Chile, will be erected and enter into operation by 1960. Its initial capacity will be 20,000 tons of copper a year, plus by-product sulphuric acid.

Lead and zinc accounted for 16 per cent of total Latin American output in 1955, having risen from 13 per cent in 1945. Both metals play an important role in the mining economies of Argentina, Bolivia, Guatemala, Honduras, Mexico and Peru. In 1955, lead and zinc combined accounted for 12, 10 and 15 per cent respectively of the visible exports of Bolivia, Mexico and Peru.

Latin American production increased by 5.1 per cent annually during the period 1945-55. World production rose by 10.2 per cent during the same period; hence Latin American production declined from 20 to about 12 per cent of the world total.

The value of smelted lead and zinc dropped in relation to the total value of both metals during 1945-55; in other words, production of ores and concentrates increased at a much greater rate than smelting capacity. Lead is smelted in Argentina, Brazil, Mexico and Peru, and to some extent in Bolivia, Chile and Guatemala. Zinc is smelted only in Argentina, Mexico and Peru.

As a result of its expanded zinc-smelting capacity, Peru will very soon be one of the world's largest producers of metallic zinc. The major mining enterprise in the country has been devoting a large part of its \$81,000,000 industrial expansion programme to increasing zinc output. The Oroya smelter is being further expanded to a total capacity of between 240 and 260 tons daily.

Precious Metals

Precious metals are produced in all the Latin American countries, with the exception of Haiti, Paraguay and Uruguay. Platinum is mined only in Colombia, while Venezuela and the Dominican Republic produce only gold. In all the other countries production is divided between gold and silver.

Platinum accounts for less than 2 per cent of the total value of Latin American production of precious metals. Silver has been gaining in value recently in relation to gold. In 1945 it represented approximately 39 per cent of total value at current prices, rising to 54 p.c. in 1955. Although world production of all three metals increased by 3.2 per cent annually during the period 1945-55, production in Latin America shows an average decline of 0.8 per cent. Colombia's production fell by 1.5 per cent annually; Mexico's by 2.1 per cent; Brazil's by 3 per cent, and Chile's by 2.5 per cent. By contrast, in Bolivia and Peru, production increased by 1.8 and 4.8 per cent p.a.

Other Materials

This group includes tin, antimony, mercury, beryllium, selenium, strontium, zirconium, bismuth, cadmium, indium and thallium. For Latin America as a whole, the total production declined by 2.34 per cent annually, due to a 3.14 per cent annual drop in the mining of tin, which is the most important of these metals in the region's economy.

Chemical Minerals and Non-Metallics

The various components of the chemical minerals group showed widely varying patterns of development. Nitrate declined slowly in absolute and relative value, continuing its pre-war trend. Arsenic declined more sharply to less than one-fifth of its 1945 value by the end of the period. Sulphur rose spectacularly after 1954.

As a result of these changes, nitrate accounted for 61 per cent of the total value of the group in 1955; guano for 6 per cent; iodine for 3 per cent; potassium salts for 2 per cent; fluorspar for 5 per cent; salt for 6 per cent; and sulphur for 14 per cent. Magnesium sulphate, phosphate rock, pyrites, and arsenic made up only 1 p.c. of the total.

Non-metallics include asbestos, mica, graphite, quartz, talc, barytes, diamonds, feldspar, diatomite, kaolin and magnesite. These commodities are mined in Argentina, Bolivia, Brazil, Chile, Colombia, Mexico, Paraguay, Peru, Uruguay and Venezuela. Brazil, Mexico and Venezuela account for about 95 per cent of the total. Production of non-metallic minerals grew most spectacularly in Venezuela, by 18.6 per cent per year, diamonds accounting for virtually all this country's output. Production in Brazil grew by about 4.7 per cent per year, including substantial quantities of asbestos, mica, graphite, quartz, talc, barytes, diamonds, magnesite and feldspar. In 1955, these comprised about 11 per cent of the total output of Brazil. In Mexico, increased production of graphite was offset by a sharp decline in the mining of mica, the total increasing by only 0.7 per cent per year.

DEVELOPMENTS IN THE USE OF COAL

COAL and oil are chemically closely related; both contain carbon and hydrogen. Is it impossible for the coal industry to benefit from the growing market for distillate oils? Many millions of tons of coal are mined in the United Kingdom at a cost of less than 3d. a therm. A competitive price for high-grade motor spirit ex-works is about 13d. a therm. There is, therefore, a margin of 10d. a therm, or more than 300 per cent of the price of the coal, available for converting coal into motor spirit. There is nothing obviously impossible in the production of motor spirit from coal at a competitive price, but there are many difficulties.

The Fuel Research Station has engaged in research on oil synthesis from coal for a number of years and similar research has been in progress in other countries.

The successful commercial manufacture of gasoline and diesel fuel from coal in the United Kingdom is years ahead. Estimates based on the best existing knowledge suggest that it is possible, but there may be and, indeed, probably are, many difficulties to be overcome.

There is another *caveat* in the assessment of all such projects; they depend upon the cost of coal, or rather the oil/coal price ratio. The present cost of mining coal in the East Midlands Division does not make such projects look in any way unpromising, but the same cannot be said of mining costs in all parts of the United Kingdom.

Gasification Under Pressure

I have discussed this project to make motor spirit from coal first because of the repercussions that this possibility may have eventually upon the coal industry and because it is more ambitious and looks further ahead than many more obvious and easier lines of research and development. A substantial advance in the art of gasification under pressure, essential for successful oil synthesis, would have more important results.

The cost of distributing energy in large quantities in the form of gas produced under pressure is very much lower than the cost of distributing the same amount of energy in the form of electricity or coal by rail or road. As a means of moving energy in large quantities overland the pipeline has no serious competitor. The cost per therm falls by 50 per cent if the capacity of a pipeline is increased from 60,000,000 to 240,000,000 cu. ft. per 24 hours. The cost of transmission of gas produced at high pressure follows the square-root law to a close approximation.

The full economy of long distance gas transmission is not achieved unless gas is generated under pressure. If the gas has to be compressed after production it may increase transmission costs two or three times or more depending upon circumstances. This compression cost is nevertheless accepted in Holland, France and Germany as worthwhile in the distribution of coke-oven gas by their high-pressure grids.

The Lurgi process is the only process fully proved commercially for the total gasification of coal under pressure. This process is now to be exploited by the Scottish Gas Board and it seems certain that one of the first high-pressure gas grids in the United Kingdom will be in Scotland. Substantial improvements in

the efficiency and economics of total gasification are possible by working at higher temperatures than the proved Lurgi process. There is a new hydrogenation process under development at the Gas Council laboratories at Birmingham. The plant requiring development is similar to the slugging gasifier required for successful oil synthesis. There is no more important development project in the fuel and power industries.

Very great economies are possible in the means by which energy is moved from the coalfields to the main consuming centres, economies that can make a contribution to the country's standard of living. At the centre of the picture are the gas industry's plans for a high-pressure gas grid and high-pressure gas production. The future of some coalfields over the next 50 years is clearly bound up with these plans. In particular, the Midland coalfields, which in future will produce more than 60 per cent of the United Kingdom coal output, will need the most economic means for transporting a part of their energy output to Lancashire, London and the South of England. Looking even further ahead, a link between British and Continental gas grids may prove expedient.

Future Pattern of Energy Supplies

I have discussed oil and gas production from coal as separate questions. However, by the integration of oil and gas production further economies are possible. For example, the production of oil and chemicals may be used to offset the seasonal load of the gas industry.

I have suggested that oil and gas can look forward to an expanding market, and that an increasing amount of coal should be used to make gas in large plant situated in the coalfields. In contrast, the market for solid fuel by the small user will contract. This is only likely to proceed very slowly because the demand for different fuels depends upon the standard of living and upon the distribution of the national income. Even if the standard of living doubles in 25 years, as a bold Chancellor suggested that it should, the distribution of the national income will be such that the great majority will still not choose to afford electricity, or even gas, for all means of heating. Industry will also still require energy, particularly process heat, in the cheapest form.

Public opinion and the Clean Air Act are likely to enforce a greater contraction in the use of raw bituminous coal, than in the use of processed fuels. It is significant that the best smokeless solid fuels, such as Phurnacite, have an expanding market in spite of their higher cost. Research at the N.C.B. Coal Research Establishment has shown that there are important technical possibilities of producing much better solid fuels.

All coal-processing is expensive and it is not, of course, possible to produce a manufactured fuel at a cost as low as raw coal. It is, however, difficult for the small consumer to use raw coal with reasonable efficiency and it is worthwhile paying a higher price for improved smokeless fuels for more efficient use.

The Tenth W.M. Thornton Lecture was delivered by A. H. A. Wynn, M.A., Scientific Board Member, National Coal Board, to the annual convention of The Association of Mining, Electrical and Mechanical Engineers at Buxton on June 13, 1958. Extracts from this forward-looking address are given below.

At the present time, coal provides 85 per cent of the United Kingdom's energy requirements and imported oil about 14 per cent. A part of the coal is converted into electricity and gas, and energy supplies of consumers may be classified considering the electricity and gas industries as suppliers of energy. We then find that 69 per cent of consumers' energy supplies are solid fuel, 18 per cent liquid fuel, 7 per cent gas and 6 per cent electricity.

Of these different forms of energy, solid fuel is the cheapest and electricity very much the more expensive. The average price of electricity is about 44d. a therm [compared with 19d. a therm for gas and about 7d. for solid fuel]. This high price reflects a low efficiency of generation of 25 per cent in 1956-57 and high capital costs compared with the other fuel industries; in contrast, the thermal efficiency of the existing gas industry is over 78 per cent. However, for a great many purposes, notably for mechanical power in industry and for lighting, electricity is the most economic form of energy and is quite indispensable. The nuclear power stations now planned for completion during the next ten years will add about one-third to the available supply of electricity—about 2 per cent of consumers' gross energy requirements. In order to produce the same increase in electricity supply from coal a 7 per cent increase in coal output would be needed.

Gasification and Nuclear Power Complementary

The inherently high costs of electricity generation and distribution are responsible for much of the high capital cost of the nuclear programme. A similar investment in high-pressure pipelines and pressure gasification would provide consumers with about ten times as much energy at a very much lower cost per therm. However, pressure gasification and nuclear power stations are not alternatives in an expanding economy; they provide energy in different forms and if nuclear energy can release coal from its present use in power stations and make it available for use at two or three times the efficiency in pressure gasification plant, it will make a contribution greater than is apparent in the figures of the present nuclear programme. In an expanding economy, nuclear power stations and pressure gasification should be complementary developments.

The high efficiency of use of electricity for the provision of mechanical power, lighting, and many other less important purposes, makes the further expansion of the electricity industry a necessity. It seems likely, however, to remain basically uneconomic to use electricity to provide the bulk of the process heat of industry or space heat of buildings, and by far the greater part of our energy supplies are needed for these purposes. Nuclear thermal energy may make an important contribution to industrial process heat in due course, but it is difficult to believe that this contribution can come via the generation of electricity in single-purpose plant.

MINING MISCELLANY

A company entitled "Carboneras del Valle del Cauca Ltda." has been founded in Cali, Colombia, to exploit the coal reserves in that area. The Instituto de Fomento Industrial, an official organization, is a large shareholder.

According to Tass, the Soviet news agency, the first diamond extracting plant in the Western Yakutian has already yielded "thousands of carats". A second plant is to be commissioned in August.

From Southern Rhodesia, Barclays Bank D.C.O. reports the Minister of Mines as saying that the Colony has at least 1,000,000,000 tons of iron ore deposits, with a ferrous content varying between 56 and 64 per cent.

Val John Explorations, which holds 9 sq. miles of reservation 50 miles from Halifax, Nova Scotia, is endeavouring to develop commercial tin deposits.

The New Jersey Zinc Co. will close its mine at Ivanhoe, Virginia, U.S.A., on July 1, and will cut production substantially at its nearby Austinville mine. In addition, work on developing the new Flat Gap mine at Treadway, Tennessee, has been suspended.

A radiometric aerial survey for signs of uranium mineralization has started over 4,000 sq. miles of Kenya's Coast Province. The survey is being undertaken on behalf of the Kenya Government by the U.K. Atomic Energy Authority, in conjunction with Hunting (Geophysics) Ltd. It will be completed in July. The aircraft used is a Percival Prince, equipped with the latest type of Harwell

scintillation counter, which makes a permanent record of the intensity of radiation along the path of flight.

The U.S. Federal Trade Commission announced that 33 producers of high-volatile coal, located principally in Virginia and West Virginia, had filed a statement of their intention to engage in export trade. The name of their association is the High Volatile Coals Export Association Inc.

Japan's iron ore imports during the 1957-58 financial year (April to March) reached the all-time record total of 8,968,000 tonnes, which represented an increase of 10 per cent over the previous year. Malaya was again the largest supplier with 2,805,000 tonnes, followed by India (1,495,000), the Philippines (1,449,000) and Goa (1,138,000).

Intensive interest is being shown in French Equatorial Africa by Western Germany. During recent months delegations of German parliamentarians, journalists, bankers, industrialists and travel agents have visited the territory, and there have been numerous visits by German businessmen. The Germans are interested in prospecting this and other territories in French Africa, where large amounts of German Government money are expected to be invested under the Common Market arrangements. They are also seeking outlets for German industry in the supply of capital equipment and other goods.

A company with an initial capital of 30,000,000 frs. C.F.A. has been formed to study the economic possibilities of the Gaboon. Half the capital is held by the

Government of the Gaboon, 36½ per cent by various French companies (including the Suez Canal Co.), and the remainder by German and Belgian companies. Another company has been formed to develop the uranium deposits found near the manganese at Franceville, French Equatorial Africa. In this case the capital is held by various French finance houses and by the French Atomic Energy Commission.

Fifteen field parties—four more than last year—have been sent out by the Ontario Department of Mines and are now at work in widely scattered areas of the province. The programme includes geological mapping and the examination of mineral occurrences.

Panama recently exported 1,923 tons of manganese ore to the steel mills in Birmingham, Alabama, this being its first bulk shipment of manganese in several years. Exploraciones Rosario, S.A., Cia., the exporter, a subsidiary of New York and Honduras Rosario Mining Co., operates an open-pit manganese mine in Nombre de Dios, Province of Colon.

The first copper refinery built east of the Mississippi river in half a century has been brought on stream by Reading Metals Refining Corporation, a wholly-owned subsidiary of Reading Tube Corporation. The new electrolytic refinery, at present occupying approximately 100,000 sq. ft., is located on a 16-acre site in Ontelaune township, Pennsylvania. An additional 79 acres are available for future expansion.

Planning permission for the establishment of an iron ore stocking ground near Chapel Bay, on the Angle Peninsula, Pembrokeshire, South Wales, has been granted by Mr. Henry Brooke, Minister of Housing and Local Government and Minister for Welsh Affairs. The Angle Ore and Transport Co., which is sponsoring the scheme, envisages ships of up to 100,000 tons deadweight off-loading the ore, which would later be shipped in smaller vessels to South Wales steel ports.

Examination has begun of the possibilities of mineral extraction in French Sudan where, so far, there has been little mineral development. Preliminary prospecting has been carried out at Kayes and Nioro (copper and iron), Keniela (gold; diamonds having already been found in promising quantities), Sikasso and Bougouni (manganese, tin and tungsten), Gao and Bourem (phosphates). One firm is already making extensive researches to determine whether Sudan's bauxite deposits are of workable quantities. Under a similar programme in Dahomey, deposits of copper, gold, iron, coal and rutile have been discovered. Further research is to be carried out, particularly regarding the iron deposits in the north and the coal in the south of the territory.

The U.S. Steel Corporation is reported to be going ahead with plans to exploit its 1,000,000,000-ton iron reserves in the Mount Reed-Mount Wright area of Quebec. The project for developing the area is expected to cost more than

The Turow brown coal mine in Wroclaw Province, Poland, is being extensively expanded with the aid of technicians, equipment and installations from Eastern Germany. The lignite extracted is destined for use in Polish industry, with much of the output finding application in power stations and in briquette manufacture in East Germany



\$200,000,000. It includes a 193-mile access railway, a hydroelectric plant, preparation of a large open-pit mine, construction of a concentration mill to produce up to 8,000,000 tons of high-grade iron concentrates annually, building of a new deep-draft harbour, and the finding of markets in Europe and Eastern Canada as well as in the U.S. The target date set by U.S. Steel's subsidiary, Quebec Cartier Mining Co., is 1961.

Two mining engineers, winners of the first Atlas Copco bursary, have recently visited Sweden to study Swedish mining methods. Both are attending a nine-month post-graduate course at the Royal School of Mines in London. This course, which is the first of its kind to be held at the school, is intended to prepare men for executive positions in the mining industry. The picture shows the two engineers studying loading with an Atlas Copco loader type T2G in the Kiruna mine. On the left, Mr. G. H. Wallace, underground manager at the West Driefontein Gold Mining Co., and on the right, Mr. M. P. O'Connor, technical assistant to the consulting engineer of the Diamond Section of the Anglo American Corporation of South Africa. Applications for the Atlas Copco bursary, open only to qualified mining engineers, were received from many parts of the world. Selection of candidates is carried out by the Royal School of Mines and The Institution of Mining and Metallurgy, London, each sponsoring one applicant.



Winners of the first Atlas Copco bursary pictured studying loading with an Atlas Copco T2G type loader in the Kiruna mine, Sweden

The B.O.M.A. Educational Trust has been established by the British Overseas Mining Association to provide scholarships tenable at mining schools and universities in the U.K. for courses in mining engineering and related subjects. It is envisaged that up to ten scholarships, varying in value up to a maximum of £400 per annum, will be made available each year. The scholarships will not be subject to means tests. In addition, it is proposed to offer each year one or possibly two awards of £500 per annum for a two years' conversion course in mining engineering or a related subject at the Royal School of Mines to men who have recently graduated in some other branch of engineering. Further information may be obtained from the secretary of the association at 8 Great Winchester Street, London, E.C.2.

PERSONAL

Mr. B. C. Betts has been appointed marketing and sales promotion manager of Rubber Improvement Ltd.

Mr. Nelson Hogg has been appointed a senior geologist with Hunting Technical and Exploration Services Ltd., of Toronto.

Mr. F. E. Hay has been appointed a director of East Rand Proprietary Mines Ltd. in place of Mr. W. M. Frames, who has resigned.

Owing to illness and advancing years, Mr. P. J. Burgess has resigned as chairman and from the board of Kinta Kellas Tin Dredging Co. Ltd. Mr. T. H. Macer has been elected chairman and Mr. J. R. Tannock has been elected a director to fill the vacancy on the board.

Mr. R. E. M. Blakeway has been appointed a director of Crown Mines Ltd. and Harmony Gold Mining Co. Ltd. in place of Mr. W. M. Frames, who has

resigned from the boards of both companies.

Mr. T. Reekie has been appointed a director of Daggafontein Mines Ltd. and Western Deep Levels Ltd. Mr. P. H. Anderson has been appointed a director of the Western Reefs Exploration and Development Co. These appointments are in place of Mr. W. M. Frames, who has resigned from the boards.

Mr. W. H. Fleming, chief mining engineer of Dolly and Palmer Ltd. since November, 1951, and executive director since February, 1956, has been appointed to the board. He is stationed at the company's Sheffield office and is mainly responsible for its field organization, the development of which was largely due to his efforts.

Baron Edmond de Rothschild has been appointed to the board of De Beers Consolidated Mines Ltd.

Mr. J. L. Ritchie has been appointed as personal assistant to the managing director of the Consolidated Pneumatic Tool Co. Ltd. as from July 1, 1958. In making this move, Mr. Ritchie leaves the board of Aveling-Barford Ltd., of Grant-ham, a company with which he has been associated for nearly twenty-five years.

Mr. R. J. Moffat, who retires as director-general of marketing of the National Coal Board on June 30, will join Cawood Wharton and Co. from that date as consultant on the development plans of the company and its subsidiaries.

Mr. W. Blair, Mr. I. M. Campbell Rodger and Mr. J. Kissane have been appointed directors of the Johannesburg Consolidated Investment Co. Ltd.

Mr. T. A. Rogers, chief inspector of mines, has been appointed a member of the Mining Qualifications Board in place of Sir Harold Roberts, who recently retired as chief inspector.

CONFERENCES AND EXHIBITIONS

Improved global liaison and co-operation was the theme of the Hunting Group Air Survey Conference, which took place in Toronto from June 1-14. Heads of the Hunting companies in England, Australia, South Africa, New Zealand, and the U.S. attended. Mr. C. P. M. Hunting,

chairman of the group, points out that the need for air survey throughout the world is increasing apace. Only a bare 4 per cent of the earth's surface is mapped at a scale of any use to its proper development.

Delegates from the copper and copper alloy fabricating industries of thirteen Western European countries were present when the General Assembly of the International Wrought Non-Ferrous Metals Council met in Venice on June 16, under the chairmanship of Mr. C. A. Jacobsson, of Sweden. The trend of home and export business was discussed and most members reported that production of copper and copper alloy semi-finished products was being maintained at a good level.

The Commission for the Geological Map of the World recently held a meeting in Paris, at which 60 countries were represented. This body is a permanent Commission of the International Geological Congress. Its aim is essentially to promote geological maps of the vast regions (North America, South America, Europe, Africa, U.S.S.R., Asia and Oceania).

Caterpillar Tractor Co. Ltd. will be introducing at the Royal Show at Bristol from July 1 to July 4, 1958, the first D8 crawler tractor to be built in Great Britain. Produced at Caterpillar's new Glasgow tractor factory, the D8 will be equipped with a No. 8A cable bulldozer and No. 29 cable control.

CONTRACTS AND TENDERS

Portuguese East Africa

Requirements, 15,000 kgs. tin ingots, 99.95 per cent. Issuing authority, Ports, Railways and Transport Department, Lourenco Marques. Tender No. (A/CFB/1/1-84-58). Closing date, August 11, 1958. B.O.T. Ref. ESB/14558/58. Telephone inquiries to Chancery 4411, extension 738 or 771.

In the fourth week of this month Steel Structures Ltd., of Southampton, a subsidiary of John Howard and Co. Ltd., are to launch the first mobile oil drilling platform to be manufactured in the United Kingdom. The contract, worth nearly £1,000,000, part of which will be paid in dollars, was placed by the DeLong Corporation of America.

Machinery and Equipment

Pre-loaded Concrete Support

At the Bonne Terre, Missouri, operations of the St. Joseph Lead Co., some 10 per cent to 15 per cent of the original ore left as pillars since the commencement of mining in 1864 now represents an attractive ore reserve. To assist in pillar recovery, a programme of fundamental and applied research in rock mechanics is now being undertaken.

By systematic rock bolting, spans up to 100 ft. have been held while the pillars were blasted. Convergence measurements and micro-seismic records have been the principal means of assuring safety during these operations. It is hoped that further studies will allow pillars to be removed over large areas, perhaps with delayed tailings fill to control subsidence.

Replacement of high-grade pillars with concrete columns 12 ft. in dia. and up to 50 ft. in height has been practised in the past in mines of the Lead Belt. Recent studies have shown this practice to be quite unsatisfactory, on account of the convergence necessary before any appreciable load is carried by the columns. Under normal conditions a lowering of the roof by approximately $\frac{1}{2}$ in. is required before the columns carry a load approaching their safe capacity, and recent observations have shown that before this state is reached the roof breaks up and falls.

With this in view, efforts are being made to develop a system of pre-loading large artificial pillars which, in addition to preventing further deterioration of the roof, should relieve stress on adjacent pillars. Flat jacks injected with grout are being studied as a possible solution.

A DEVELOPMENT IN ROTARY TIPLERS

A rotary tippler has been developed by Maschinenfabrik Monninghoff which differs substantially from established types in that it features a new type of drive. This drive is directly powered by compressed air.

To keep the load holding space constant at its maximum value of 100 per cent, and effect a secondary improvement in the output capacity of the shaft, particularly when handling wet material, it was necessary to develop a mechanical device designed to clean the car by removing the residue in a process accompanying the actual tipping operation. It was desired, in addition, to accomplish this without any intervention by manual power or recourse to hydraulic equipment as used, for example, for washing out cars after tipping.

In the application of the new car-cleaning device, instead of holding the car or tub in position by wheel guide rails mounted in the tippler and arranged parallel to the entry direction, a clearance space is allowed above the top of the car so that during the roll motion towards the tipping position the car can move on rollers fixed at the sides.

The object of this is to allow the car to drop, in the vertical plane on reaching



One of the new range of Simplex 30 h.p. diesel locomotives at work on temporary track

an angle of 140-170 deg., against fixed stops attached to the tippler cage. Small compressed air cylinders then raise the car through 4 in. to 5 in. On the return stroke of the cylinders the car is banged down hard against the stops. This process is repeated 8-10 times. The cleaning operation is automatically controlled.

A BUNKER SWITCH

A pressure-operated bunker switch which will operate contacts when the level of material in a bunker reaches or falls below a pre-determined level is announced by Londex Ltd. The switch is ideal for heavy or abrasive materials, such as coal and also where extreme conditions of dust and moisture exist. The standard switch is designed for operating in bunkers handling 5-in. raw material.

The switch is mounted into the side of a hopper in the vertical or near vertical plane. When the level of material reaches the switch the pressure exerted on the face pad is transmitted via a liquid in the main housing to the bellows-operated pressure switch. Snap action, silver contacts then operate, these being single pole, double throw, rated at 5 amps. 250 v. A.C. or 3 amps. 440 v. A.C.

The switch comprises two main parts, a brass housing and a Londex pressure switch. The brass housing is filled with ethylene glycol which is retained on the outward face by a thick rubber diaphragm which carries a pressure pad. It is the pressure pad only which projects into the bunker. The pressure pad is usually manufactured from a tough plastic and has proved particularly successful with coal, eliminating any danger from incandescence sparking. For certain other materials, such as stone chippings, etc., an aluminium alloy pad is fitted.

The inward face of the brass housing is connected to the pressure switch. This switch comprises a bellows chamber and

a die-cast box containing the switching arrangement.

Electrical connections are made to a three-way terminal block and a cable entry grommet is provided.

NEW DIESEL LOCOMOTIVE

Motor Rail Ltd. of Bedford announce a powerful addition to their range of Simplex narrow-gauge diesel locomotives.

Built in 2½, 3½ and 4½ ton weights, this new 30 h.p. model supersedes the Simplex 28 h.p. series, having greater power and a higher speed range.

The W. H. Dorman 2 LB engine is a direct injection two-cylinder unit with overhead valves, 125 mm. bore, 130 mm. stroke. Particular attention is paid to thorough filtration of oil and air, increasing still further its efficiency in dusty conditions. The air filter includes a centrifuge pre-cleaner. Engine speeds are governed from idling (380 r.p.m.) to maximum (1,800 r.p.m.) at which speed it develops 35 b.h.p. Detachable, chrome hardened, wet liners and C.A.V. fuel injection equipment are fitted.

Hand-controlled gear delivers sand to all wheels. The throttle, clutch, brake and warning signal are conveniently placed for operation from the driver's seat. Cabs and canopies are optional extras as are battery or battery-less lighting, exhaust quenchers for naked flame mines, automatic chain lubricators, heavy steel-tired wheels, engine usage recorders and 12 v. electric starting. The centrally-hinged steel power unit cover and easily detachable side panels provide full access to the engine and gearbox.

THE CHEMICAL AND PETROLEUM EXHIBITION

An exhibit which is attracting attention at the Chemical and Petroleum Exhibition at Olympia, June 18-28, is a new chemical pump introduced by British LaBour Pump Co. Ltd. It is on view for the first time on their stand—No. 16K, Ground Floor, Grand Hall—and is of their new SZ range of pumps, specially designed for chemical service.

A fairly recent development is the type USL pump, made specifically for mines and designed to operate in confined spaces, while a pump of outstanding performance is the type BG, developed from the type G and suitable for applications in which maintenance must be at an absolute minimum, and for handling corrosive and dangerous liquors.

Sharples Centrifuges Ltd. are showing equipment typifying their activities in dry powder technology. A micromerograph is exhibited illustrating the company's activities in the field of particle size analysis, and the super classifier which opens new possibilities for dry powder classification at very low particle size cuts.

Metals and Minerals

Problems of the Fluorspar Industry

Fluorspar is used principally as a flux in the steel, aluminium and other metallurgical industries; as a flux and opacifier in glassmaking; and in the manufacture of hydrofluoric acid.

Under the influence of increasing demand, world production has been growing steadily during recent years, rising to 1,530,000 tons in 1956 from 1,040,000 tons in 1951. This situation, coupled with reduced demand from the U.S. steel industry, has resulted in temporary oversupply in the U.S. and Canadian markets.

The world's largest producer and importer of fluorspar is the U.S. In 1956 the U.S. Government announced plans to purchase a total of 250,000 tons of newly mined acid-grade fluorspar over two and a half years, the intention being to improve the domestic market situation, which had been seriously affected by Mexican imports.

In a further effort to assist domestic producers, acid fluorspar has been included in the price support programme submitted to Congress by the Eisenhower Administration. The proposed stabilization price is \$48 per ton, delivery Rosiclare, the annual amount on which the subsidy would be payable being 180,000 tons.

This proposal is opposed by the Fluorspar Importers and Producers Institute, whose spokesman, Mr. M. Karasik, said that acid-grade fluorspar should not have been included in the price support programme. United States industry, he stated, used all the acid-grade fluorspar produced in the country. Moreover, many industries had invested in fluorspar in other countries in order to ensure a continuing supply of this mineral. Among firms which have recently acquired interests in fluorspar-producing areas outside the United States—for the most part in Mexico—he instanced Du Pont, Dow, Reynolds Metal, and Alcoa.

Mr. Karasik alleged that of the 189,000 tons of U.S. acid-grade fluorspar produced in 1957, not less than 124,000 tons were purchased for the national stockpile. The Seaton Plan, he contended, would permit fluorspar producers to sell 180,000 tons annually "at bargain-basement prices". Stockpile purchases on fluorspar, it was pointed out, are scheduled to expire in September, 1959. With the subsidy price support of the Seaton Plan, domestic fluorspar would be consumed "almost as fast as it was produced". This subsidy would force foreign suppliers to seek other markets.

"In the case of acid-grade fluorspar", Mr. Karasik went on, "we have an industry which employs fewer than 1,000 workers, with limited reserves, and in which prices have kept pace with or exceeded the wholesale price indices over the last twelve years." United States Government figures, he added, indicate no sharp downward trend in the domestic production of acid-grade fluorspar. On the contrary, the trend is a rising one.

These views are of interest, not only for the light they throw on the fluorspar situation in the U.S., but as indicating the slipperiness of the path along which

the U.S. Administration finds itself travelling in its efforts to assist domestic mineral producers without antagonising other interests at home or abroad!

Recently, producers of fluorspar in Ontario and Newfoundland contended before the Tariff Board that they needed protection in Canada on defence and economic grounds. St. Lawrence Corporation of Newfoundland Ltd. and Huntingdon Fluorspar Mines Ltd., of Madoc, Ontario, urged that the board recommend to the Government a tariff of \$10 a ton. Fluorspar now enters Canada duty free.

The St. Lawrence firm said that with tariff help it hoped to recapture the major share of the Canadian market for the grades used as a flux in steel production. This company was once the largest supplier in Canada, but in recent years it devoted full production of its mine in Newfoundland to supplying the U.S. Government stockpile. This contract has now ended and the mine closed last June.

Both companies said that fluorspar from Mexico, Spain, Italy and Germany was coming on to the Canadian and U.S. markets at prices that Canadian producers could not match.

On behalf of the company, a Minerals Sub-committee of the U.S. Senate was told that reserves in Mexico and Canada would fill U.S. needs in any emergency, and it was asserted that present U.S. duties were too high. The company has large fluorspar reserves in both countries.

In the long term, the outlook for fluorspar producers can scarcely be other than bright, since this mineral finds its principal outlets in industries which can be expected to continue expanding, once the U.S. economy resumes its upward trend.

PHILIPPINE CHROMITE INDUSTRY

The business recession in the U.S. is threatening to curtail production of refractory and metallurgical chrome ore mines in the Philippines. The recession has caused cancellation of orders from American consumers starting in the third quarter this year. It may force chromite mining firms to slow down production or even shut down totally for a time.

Figures released by the Bureau of Mines show that the Philippines produced 612,159 tonnes of refractory chrome ore and 113,358 tonnes of metallurgical chromite during 1957. The corresponding outputs for 1956 were 581,658 tonnes and 127,370 tonnes.

The Philippine Cabinet has authorized Consolidated Mines Inc., the largest producer of refractory chrome ore in the Republic, to barter its ore against U.S. rice. The barter involves 30,000 tonnes of California milled rice, costing \$U.S.150 c.i.f. Manila, against the equivalent value of chrome ore costing \$30.85 a ton.

Acoje Mining Co., the country's largest metallurgical chrome ore producer, is also reported to have made representations with the Philippines Government for support in negotiations in the U.S.

for disposal of its unsold ore. Unless the company can move its present output, it may be forced to curtail operations.

A U.S. undertaking, United Western Minerals Co., has offered, in the interests of defence, to upgrade and process large stockpiles of chromite in Montana with Government help. The president of the company, Mr. Alva Simpson, told a Senate Minerals Sub-committee that he had made one proposal to convert 55,000 tons of Montana concentrate to chromium metal and chromic oxide, and another to treat 400,000 tons of Montana concentrate. He added that he had heard nothing further from O.D.M., G.S.A., or the Interior Department.

U.S. RUTILE MARKETS

Since the expansion of U.S. industry into the titanium field, U.S. imports of rutile have been sharply affected, because domestic rutile producers are cornering this market quite rapidly, according to the consensus of market opinion in New York.

The quality of domestic rutile being broadly the same as that of the imported material, price distinction is said to be determined by the rapid increase in overseas freight rates. However, this is only one contributing factor leading to cancellations of large import orders for rutile. Another reason is, of course, that since the U.S. Government's shift in expenditures from jet production to missile production, demand for titanium products has slackened. A third factor, it is alleged in New York, is that a number of importers have not held to the price structure. In order to meet with contractual agreements they have depressed their prices considerably during the past few months.

The young Western Australian industry of mining beach deposits of ilmenite has progressed satisfactorily, so far as the initial company, Western Titanium N.L., is concerned, and the first year's work has been profitable. A second producer has not been so successful and a projected third venture may depend upon market conditions. In view of the titanium position overseas, there is speculation as to the immediate future of the producers.

Consumption of titanium ingot in the U.S. during April declined to 591,876 lb. from 654,441 lb. in March, according to the Business and Defence Services Administration. Production of titanium ingot during April dipped to 659,790 lb. from 699,902 in March, while output of titanium mill products was 391,199 lb. against 509,165.

Despite the decline, an official of Allis-Chalmers Manufacturing Co. has spoken favourably of this new metal. He said that intense research and steady improvement in processes and products was "beginning to pay off in increased demand". Although some plants have shut down and others are well below capacity, producers are showing their confidence

by intensifying sales efforts and spending money for further development.

National Distillers and Chemical Corporation has leased with an option to purchase Stauffer Chemical Co.'s recently completed 25,000 s.ton per year titanium tetrachloride plant at Ashtabula, U.S.A. This plant was constructed by Stauffer to supply titanium tetrachloride to National Distiller's new titanium sponge plant, also located at Ashtabula. The sponge plant was transferred to Mallory-Sharon Metals Corporation last year at the time National Distillers acquired a one-third interest in the Corporation. Mallory-Sharon, one of the world's largest integrated producers of special metals, is now jointly owned by National Distillers, P. R. Mallory and Co. Inc., and Sharon Steel Corporation. It is expected that the start-up of the titanium tetrachloride plant will be completed by mid-summer and that the plant will then be purchased from Stauffer by either National Distillers or Mallory-Sharon.

The Export Council for Titanium Sponge, jointly organized by the Japanese Ministry of Trade and the titanium industry, has set an export goal for the

metal during the current financial year (April-March) at 1,540 tons. To achieve this target, the Council has decided to cut the export price of titanium sponge to \$U.S.3,200 per ton, f.o.b. Japan, from the previous \$3,520, in view of the reduction in U.S. domestic prices of the metal in April this year. Japan exported 2,337 tons of titanium sponge in 1957, including 2,298 tons destined for the U.S.

On the other hand, Japanese titanium mill-product manufacturers have decided drastically to reduce the domestic prices of their products in order to encourage local demand, which is at present small.

ALUMINIUM IN NORWAY

One hundred and eleven of the furnaces in the aluminium plant at Mosjøen, Norway, were put into operation in April this year. The plant was built by Elektrokemisk A/S. in less than two years. The capacity is 20,000 to 22,000 tons of raw aluminium per year. The plant will be transferred to a new company, Mosal, where two-thirds of the shares will be owned by the Norwegian firm, Elektrokemisk A/S., and one-third by the Swiss firm, Alum.-Industrie-Aktiengesellschaft.

COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

Trading has again been very active on the Exchange during the past week and except in the case of tin, markets have made a satisfactory showing and values have improved further.

ANACONDA IN A HURRY

Copper has again been the centre of interest on both sides of the Atlantic. The U.S. Administration's proposal to stockpile a substantial tonnage of copper for a year, which we referred to in our last report, has reached a further stage in having been formally introduced on Monday into the Senate and the House of Representatives, and the Secretary of the Interior is scheduled to appear before the Senate Minerals Sub-Committee later in the week. It is regarded as a near certainty that this measure will come into force with the minimum of delay.

With the London quotation—at any rate for the time being—established at over the £200 level, customs smelters moved their price up 1½ c. to 26 c., thereby establishing a 1 c. premium over the U.S. producers. Although a rise in the producer price in due course had been expected, if only on the strength of the stockpiling programme, it was anticipated that they would probably bide their time in order to see how demand developed. However, Anaconda boosted their price to 26½ c. on Monday and the following day customs smelters brought themselves into line. The other producers have so far not followed suit. During the past week the domestic scrap copper quotation in the States has also advanced and now stands at 21 c. for No. 2 Wire.

Whilst the rises in London and in the customs smelters' prices have a good demand for physical metal behind them—on the Continent electro still commands a premium of fully £10 per ton—enquiry on the part of U.S. consumers for producer copper has been on a restricted scale and would appear to be based not

so much on any improvement in actual consumption as on the need for inventory replacement against further price advances. It remains to be seen whether the current activity will show any falling off in July and August, normally quiet months, coupled with some price reaction.

It must not be overlooked at this point that the question of the U.S. import duty on copper is still in the balance and the future course of prices particularly in Europe, will depend on whether the suspension is renewed at the end of this month or not. Some quarters hold that it will be on the strength of the stockpiling programme, but time is running short and unless Congress acts quickly to order a further suspension, foreign copper imports into the States will, as from July 1, be automatically subject to a duty of 1.7 c. per lb. if the price of the metal is above 24 c. and at 2 c. per lb. below that price.

The following figures in s.tons were issued by the Copper Institute during the past week:—

U.S.	May, 1958	April, 1958
Production of crude copper	90,843	97,598
Production of refined copper	115,978	120,467
Domestic deliveries	78,631	81,930
Stocks of refined copper	253,463	251,099
Foreign		
Production of refined copper	109,342	106,428
Stocks of refined copper	244,778	250,067

U.S. stocks of refined a year ago were 155,365 s.tons, and elsewhere 221,396 s.tons, while refined production in the States in May, 1957, was 151,785 s.tons, and elsewhere was 124,278 s.tons.

In U.K. official warehouses, copper stocks at the end of last week showed a decline of 740 tons, mainly in London, and now stand at 14,882 tons.

OUTCOME OF I.T.C. MEETING AWAITED

Although cash tin has remained at the buffer stock support level, forward tin values declined sharply at the beginning of the week but later staged a recovery. The decline coincided with the opening of the International Tin Council Meeting in Paris and at the same time the market, with consumer interest quiet, was subjected to a certain amount of selling pressure on the part of what might well be Russian interests. A communiqué will be issued at the close of the meeting in Paris, but amongst other matters on the agenda will, no doubt, be the question of the substantial sales of Russian and Chinese tin, the continuance of export quotas for a further period, and whether an approach should be made to the Soviet Union to join the International Tin Agreement. Shipments from Singapore for the first half of June were 432½ tons and from Penang 1,586 tons, against 503½ tons and 1,026½ tons respectively for the first half of May. Tin stocks in U.K. official warehouses at the end of last week showed a sharp increase of 269 tons and now total 19,101 tons.

On Thursday morning the Eastern price was equivalent to £75½ per ton c.i.f. Europe.

LEAD-ZINC FIRM ON STOCKPILE NEWS

The undertone of the lead and zinc markets has been very steady in anticipation of the U.S. Administration working out some scheme to support these metals on the lines of the proposal to stockpile copper. An announcement to this effect was forthcoming in the middle of the week and both markets advanced sharply. In the case of lead the proposal is to stockpile 100,000 tons at not less than 13 c. and in the case of zinc 200,000 tons at not less than 10½ c. Further details are awaited.

The figure for zinc roughly corresponds to the smelter stocks which at the end of March are reported having risen to 203,600 tons, whilst at the same time consumer stocks fell to 77,700. Demand for both metals, though still quiet, has shown a little improvement, particularly in the U.S. for special types of prime Western zinc reflecting the improvement in the steel figures there. Consolidated Mining and Smelting Co. of Canada announced during the week that their lead production would be cut 20 per cent starting with a three-week shutdown at Trail during July/August and thereafter running production at a reduced level for the rest of 1958.

Closing prices are as follows:

	June 12		June 19	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash	£199	£199½	£203½	£204
Three months	£201	£201½	£204½	£204½
Settlement	£199½		£204	
Week's turnover	17,225 tons		13,450 tons	
LEAD				
Current ½ month	£74	£74½	£77½	£78½
Three months	£75½	£75½	£79	£79½
Week's turnover	6,600 tons		8,875 tons	
TIN				
Cash	£730	£730½	£730½	£731
Three months	£734	£734½	£734½	£734
Settlement	£730½		£731	
Week's turnover	1,265 tons		1,880 tons	
ZINC				
Current ½ month	£65½	£65½	£66	£66½
Three months	£65½	£66	£66½	£67
Week's turnover	9,150 tons		10,575 tons	

London Metal and Ore Prices appear on page 738.

Mining Finance

In the Oppenheimer Tradition

If there existed any feeling that the outlook of Anglo American would undergo a major revision under its new chairman, such feelings have been dispelled by Mr. H. F. Oppenheimer's first chairman's statement this week. Indeed, the whole tone of the statement is one of continuity, and Mr. Oppenheimer devotes much of his review to an examination of the fruits of his father's long and outstanding chairmanship.

Perhaps the most remarkable of Sir Ernest's achievements was that of bringing the Corporation safely through the early 1930's. This was brought about by putting a strong liquid position (and, therefore, a conservative dividend policy) above all else. That this will continue to be his guiding principle, and that the Corporation will continue its dynamic policy of reinvestment in new industrial enterprises, is implicit in Mr. Oppenheimer's quotation from an earlier statement by his father, "Our policy", Sir Ernest once said, "is to earn profits, but to earn them in such a way as to make a real and permanent contribution to the well-being of the people and to the development of Southern Africa". Like Sir Ernest, Mr. Oppenheimer is confident of the future both of the Corporation and of the sub-continent.

One assumption underlying Mr. Oppenheimer's remarks does, however, call for closer examination. Referring to the Corporation's undeniably well-balanced portfolio he says, "The combination of gold on the one hand and copper and diamonds on the other, reacting, as they must, in opposite ways to the general condition of the economy, gives our Corporation an exceptional degree of stability". Certainly, Mr. Oppenheimer's conclusion is unassailable—the great financial strength of the Corporation and the wide diversification of its interests ensure this—but his premisses are open to question. Particularly so is the assumption, widely held though it is, that gold shares are today as much a hedge against depression as against devaluation.

In the economist's "model" depression, income from gold shares will tend to rise for three reasons. Firstly, the cost of materials will tend to fall, reflecting the decline in commodity prices. Secondly, labour costs will decrease, because closures and cutbacks in other industries will create a man-power surplus seeking employment on a buyer's market. And thirdly, revenue will increase, because the demand for gold as a hedge against bank and credit failures will tend to force the price up, even to the point of actual devaluation.

Applied to present conditions, these arguments are by no means convincing. Material costs will, indeed, tend to fall, but only gradually, for the ponderous force of wage demands by organized labour will, at first, nullify the effect of lower raw materials. Labour costs themselves will probably do no more than cease to climb, for the same reason. And, most important of all, after Mr. Macmillan's recent visit to Washington, gold is as firmly tied up to the \$35 standard as ever, so that the possibility of a revision in the price must be discounted as

problematical. Indeed, if a major depression were allowed to develop from the present U.S. recession, world trade would probably fall away to such a point that the gold price revisionists would lose their strongest argument.

Nevertheless, all this is not to say that for Anglo American—and for that matter for the private investor—a substantial gold investment in the portfolio is other than a source of strength. It has been pointed out on many occasions, both here and in the *M.J. Quarterly Review of South African Gold Shares*, that at present yields Kaffirs are among the most promising investments on the market, quite irrespective of any element of hedging. In the case of Anglo American this is the more true because, fortuitously, the period of increasing dividends from the many young gold mines under Anglo's management has coincided with the drop in revenue from copper (and to a lesser extent, diamonds and coal), thus operating as a quasi-hedge. It must be borne in mind, however, that if copper had not fallen to the extent it has, the Corporation's income would be so much the better. The gold portfolio has, in fact, provided not a hedge but a bonus coming into the accounts at just the right time to stabilize revenue, and, should copper recover in the reasonably short term, this will immediately be reflected in a sharp upturn in Anglo's dividend income.

MAJOR HERRING IS NOT PESSIMISTIC

The major problem for Central Provinces Manganese Ore over the past few years has been railage. Lack of capacity on the Indian Railways has meant that the company has not been able to take anything like full advantage of the buoyancy of the steel trade, its main customer, when this was at its peak. This is most clearly illuminated in the accounts for 1957 when, for the first time for some years, rail facilities began to improve, resulting in an increase in the gross trading balance from just under £1,700,000 in 1956 to over £3,000,000.

Unluckily for C.P. Manganese, however, it seems that the improvement has come too late. The fortunes of the company are intimately bound up with those of the steel industry, that of the U.S. in particular, and speaking at the annual meeting last Friday, Major A. C. Herring, the chairman revealed that there were already signs that demand during the second half of this year "will not be as heavy as usual". He felt, nevertheless, that the results for the current year will not be unsatisfactory—railings have continued at a good level up to the present time—looking further ahead, he is by no means pessimistic. The mines are now in good shape as a result of considerable capital programmes in the past, and relations with the U.K. and U.S. buyers and with the Indian State Trading Corporation are very good. The liquid position on the balance sheet is also healthy, and in any case the company has a substantial tax cushion—in 1957

the government took almost £2,000,000 of the gross profit, leaving barely £1,000,000 for appropriation.

Referring to the introduction of a flat rate of U.K. profits tax, Major Herring pointed out that this will be of no benefit to the company, almost all U.K. taxes being absorbed by double taxation relief. Major Herring's statement is on page 737.

WHAT DID HENDERSON'S SELL?

The questions, posed in this column some weeks ago, regarding the remarkably improved results achieved by Henderson's Transvaal Estates last year, are answered albeit negatively, in the full accounts published this week. Neither coal nor cement can account for the improvement, for the profit from these sources is barely changed from last year.

In fact, the better results can be traced to two factors; investment realization and sales of properties. That the first of these sources of income should do better in 1957 is no surprise—stock markets were clearly much more amenable to Henderson's operations that year than in 1956—but the extent of the improvement (1956: Dr. £18,665; 1957: Cr. £11,381) is remarkable.

Income from property sales, the other factor, rose from £5,705 in 1956 to £92,588. Of this, some £45,000 is attributable to the sale to Union Corporation in mid-1957 of some 22,000 morgen of mineral rights in the Kinross area. This leaves about £42,000, apparently derived from the sale of coal rights over two O.F.S. farms, and of surface rights on a farm in the Witbank area. £42,000, however, seems a large figure for such a transaction, for if the coal rights were of any considerable value, Henderson's would, no doubt, have retained them. Perhaps Sir Joseph Ball, Henderson's chairman, will clarify the matter at the meeting on July 10.

FINAL KAFFIR DECLARATIONS

Remaining declarations of the Kaffir dividend season are summarized below:

Company	Dec. 1956	June 1957	Dec. 1957	June 1958
	s.d.	s.d.	s.d.	s.d.
J.C.I.	2 3	2 3	2 3	2 0
Randfontein	4	3	4	3
E.C. d'Or
Central Mining				
Blyvoor	1 0	1 0	1 0	1 0
City Deep	6	6	6	6
Cons. M.R.	1 6	1 3	1 3	1 3
Crown	2 0	1 0	1 3	1 6
Durban	1 6	1 6	1 6	1 6
E.R.P.M.	2 6	2 3	2 3	2 0
Modder E.	1 0	1 0	9	9
Hartebeest	1 6	2 6	3 0	3 6
R. Leases	1 1	1 1	3	1 1
Union Corp.				
E. Geduld	2 0	2 0	2 0	1 9
Geduld P.	6 6	6 3	6 6	5 0
Grootvlei	1 3	1 1	1 3	1 1
Marievale	1 3	1 0	1 3	1 1

FINANCIAL NEWS AND RESULTS IN BRIEF

Kinta Tin Improves Profit.—Almost alone among tin producers, Kinta Tin Mines made a higher profit in 1957 than in 1956, even before taking account of O.T.C. benefits. Gross proceeds from ore sales rose to £305,020 against £228,384, leaving a net profit before taxation of £210,685. Dividends for the year totalled 6s. per share, an increase from 4s. in 1956. The improvement was due to better grade ground, coupled with an increase in the yardage treated. Meeting, London, July 10. Mr. A. G. Glenister is chairman.

Premier Withdraw National Mining Bid.—Insufficient acceptances having been received, Premier Consolidated Oilfields have withdrawn their offer for the shares of the National Mining Corporation.

Idris Hydraulic Tin.—Although 1957 mining profits of Idris Hydraulic Tin were almost exactly halved at £17,354, the fall in taxation as a result of the company's O.T.C. qualification left net profits £16,000 higher at £26,903. Two distributions were made during the year, an ordinary dividend of 9d. per share, and a special cash distribution of 2s. per share from the capital profit made on the sale of the Kranji section. Meeting, London, July 9. Mr. A. G. Glenister is chairman.

New Kleinfontein Will Not Close.—Replying to a shareholder's question at the annual meeting of the New Kleinfontein Company, Mr. Geo. Mackenzie, the chairman, said that there was no intention of ceasing operations as long as there was a possibility of earning profits once again.

British-Borneo Petroleum To Resume Interims.—Speaking at last week's annual meeting of British-Borneo Petroleum, Mr. Campbell L. Nelson, the chairman, announced that the company intends to resume the pre-war practice of declaring interim dividends. The first of these, of 6d. per share, is expected in November. He also revealed that the question of royalties which may be due to the Syndicate from the Shell group's production on the Brunei Continental Shelf had now reached the point at which a court hearing can be sought. Other extracts from Mr. Nelson's statement appear on page 738.

Heavy Mason and Barry Loss.—Even after writing back some £22,000 taxation no longer required, Mason and Barry lost £26,379 on 1957 operations. This compares with a profit of £20,351 in the preceding twelve months. The dividend is passed.

MARKET HIGHLIGHTS

Base-metal shares continued to dominate the mining market scene on the Stock Exchange this week. Once more copper shares were commanding most attention. A hesitant start on Monday soon gave way to more buoyant conditions as the metal price strengthened in London to a seven-month peak. Many new highs for the year were established, notable among them being the advance to over £5 a share in Messina.

Towards the latter part of the week, however, a more cautious tone became noticeable. It was realized that in the light of likely dividends for the current financial year, many share prices were discounting a great deal of improvement in the level of U.S. business activity. True, copper had recovered well, but was a metal price of £204 a ton full justification for the rise in share values, particularly as the metal was responding not so much to a real revival in demand as to a one-year-only U.S. stockpile plan?

No such fears seemed to be evident in Lead-zinc shares. For one thing it was argued that these metals, unlike copper, had only just emerged from their lowest levels. Any similar stockpile plan for them would thus justify an even sharper rise in price. Some dealers, however, doubted the wisdom of this argument in view of the fact that in many cases mines were operating at below economic levels and even a sharp increase in metal prices would do little more than help to offset the fall in earnings that had already taken place. Even so, there was a demand for good-class issues and in a few days Consolidated Zinc bounded 7s. to 51s. 6d. and New Broken Hill rose 3s. to 35s. 3d.

There was no such enthusiasm for tin shares which, already depressed, took the turn for the worse when the price of forward tin fell below £730 a ton. Later, the market rallied with the improvement in the metal price, but the movement did not get very far. Strangely enough, Beral strengthened to 28s. 3d. despite the depressing course of both tin and wolfram.

Gold shares were overshadowed by the interest in base-metal issues, but at the same time remained quite firm. Free State Geduld attracted attention from time to time on the growing hope that the next quarterly report (due in a month) may disclose new high development values. Selling of the new shares in President Brand and Steyn finally dried up and prices rallied on some investment support.

The annual statement of Mr. Harry Oppenheimer created a favourable impression on sentiment in the gold share market. There was little change in "Anglo" themselves, but much of the firmness of the operating mines stemmed from this review.

Rio Tinto failed to respond to the firmness of copper shares generally. It was thought that although the near-term outlook for Rio's uranium was good, there was a fair amount of uncertainty about what will happen when present five-year Canadian contracts expire.

As we go to press, the anticipated Bank Rate reduction to 5 per cent was having little or no effect in mining markets.

BURMA MINES LIMITED

The following summarises the Operating results of BURMA CORPORATION (1951) LIMITED (Incorporated in the Union of Burma and jointly owned by Burma Mines Limited and the Union Government) for the NINE months ended 31st March, 1958.

ORE EXTRACTION

Quarter ended 30th September, 1957	29,862 tons
Quarter ended 31st December, 1957	29,342 tons
Quarter ended 31st March, 1958	31,247 tons
	90,451 tons

PRODUCTION

Quarter Ended	Concentrating Ore Milled (dry tons)	ASSAYS		
		Ozs. Silver	% Lead	% Zinc
30 September, 1957	28,370	13.29	16.46	11.46
31 December, 1957	29,303	15.18	18.50	12.45
31 March, 1958	30,623	16.29	19.97	12.85

Marketable products were as follows:—

Quarter Ended	Refined Lead, Tons.	Refined Antimonial Lead, Tons.	Refined and Dore Silver, Fine Ozs.	Copper Matte, Tons.	Nickel Speiss, Tons.	54%–57% Zn. Concentrates, Dry Tons.
30 September 1957	3,000	99	266,974	90	129	4,196
31 December 1957	3,209	—	292,618	42	6	4,013
31 March 1958	3,214	138	303,267	62	118	4,552
	9,423	237	862,859	194	253	12,761

ESTIMATED REVENUE AND EXPENDITURE

	Quarter ended			Total for NINE months ended
	30.9.57	31.12.57	31.3.58	31.3.58
Gross Revenue (after adjustment of value of Metal Stocks)	K. 63,35,700 (£475,177)	K. 71,00,700 (£532,553)	K. 73,95,300 (£554,648)	K. 2,08,31,700 (£1,562,378)
Operating Expenditure	K. 63,53,900 (£476,542)	K. 65,31,500 (£489,863)	K. 66,61,300 (£499,598)	K. 1,95,46,700 (£1,466,003)
Operating Loss	K. 18,200 (£1,365)	—	—	—
Operating Profit	—	K. 5,69,200 (£42,690)	K. 7,34,000 (£55,050)	K. 12,85,000 (£96,375)
Taxation	—	K. 23,000 (£1,725)	K. 252,000 (£18,900)	K. 2,75,000 (£20,625)
Depreciation	K. 2,45,500 (£18,412)	K. 2,59,000 (£19,425)	K. 2,76,700 (£20,753)	K. 7,81,200 (£58,590)
Capital Expenditure	K. 4,23,800 (£31,785)	K. 2,92,600 (£21,945)	K. 3,32,000 (£24,900)	K. 10,48,400 (£78,630)

After deducting the foregoing estimates for Taxation and Depreciation the estimated Net Profit for the QUARTER ended 31st March, 1958, is K. 2,05,300 (£15,397) and for the NINE months to that date K. 2,28,800 (£17,160).

The Sterling figures shown are based on a Rate of Exchange of 1/6d. per Kyat.
37, Dover Street, London, W.1.

CHAIRMAN'S STATEMENT: ANGLO AMERICAN CORPORATION OF SOUTH AFRICA LIMITED

(Incorporated in the Union of South Africa)

Anglo American Corporation's strength based on combination of Gold, Copper and Diamond Investments

IMPORTANCE OF GOLD FOR STABILITY

TRIBUTE TO SIR ERNEST OPPENHEIMER'S ACHIEVEMENTS DURING HIS FORTY YEARS AS CHAIRMAN

THE following are extracts from the statement by the Chairman, Mr. H. F. Oppenheimer, which has been circulated to members:—

My father founded our Corporation in 1917 and was Chairman until his death on November 25 last year. During these forty years he built up the Company from small beginnings and through many vicissitudes to a position of great size, strength, and stability. And yet, at the beginning, the prospects of the new company seemed very limited. The leading South African mining houses, as they still exist today, had, with one exception, been founded many years earlier and it appeared that the opening up of the Witwatersrand goldfield was almost complete. But my father was convinced in 1917 that South Africa was a land of unbounded opportunity, and that conviction was undimmed on the day of his death.

To me it has always seemed that my father's greatest achievement was in bringing us safely through the economic storms of the 1930s, when our preference dividends were at one time nearly four years in arrear. Yet at that time we already held the majority of the copper and diamond assets to which so much of our subsequent prosperity has been due.

One lesson of those years was the paramount importance of a sound cash position, and as a necessary corollary, a conservative dividend policy. The other great lesson we learnt from the depression was the importance for the stability of the Corporation of large gold shareholdings. Our holdings in producing gold mines at that time were relatively small. During the 1930s, however, we took a prominent part in the expansion of the Far East Rand and participated with New Consolidated Gold Fields Limited in the development of the West Wits line. Most important of all for our future, however, was the development of the Western Reef Mine near Klerksdorp. This was a vital step towards the discovery of the new Orange Free State goldfield, in the eventual development of which our Corporation came to play a leading part.

O.F.S. Goldfield

The opening up of the Orange Free State goldfield has been one of the greatest developments in the history of mining, and in all its aspects my father took a close personal interest, not least in the provision of housing, hospital and other amenities of the highest standard for both European and African employees.

The steadily increasing profits now earned by our mines in this field have amply justified my father's faith. These profits rose from £7,143,839 in 1955 to £11,525,230 in 1956, and to £16,749,783

last year. We have become, as a Group, the largest producers of gold in the world, and the annual gold profits of the mines under our control exceed £24,000,000, with a further £7,000,000 from uranium.

Our large investments in gold are of particular importance at periods such as the present when the world economy, after years of boom, appears to be entering more difficult times. When there is a seller's market and costs are continually rising, the fixed price for gold can seem a grave disadvantage. But when commodity prices are falling, one appreciates the advantages of a product with a fixed price and unlimited market. The combination of gold on the one hand and copper and diamonds on the other, reacting, as they must, in opposite ways to the general condition of the economy, gives our Corporation an exceptional degree of stability.

Western Deep Levels

During the year 1957, which is now under review, my father gave further proof of his faith in the South African gold mining industry by making a start with the opening up of Western Deep Levels. The cost of bringing it to a milling rate of 100,000 tons per month will be in the region of £25,000,000, and it is expected that it will have a life of sixty years and will produce gold worth at the present price more than £800,000,000.

The economic recession that has occurred in the United States has inevitably affected adversely our diamond and copper investments. Although sales of diamonds by the Central Selling Organization in 1957 reached the record total of £76,772,112, there was a distinct decline in demand both for gem and for industrials towards the end of the year. This decline was met by smaller offerings of diamonds to the market, thereby maintaining stable prices.

The strong co-operative organization of the diamond trade and the financial strength of De Beers have maintained stability and confidence in this industry in the face of the American recession. Unfortunately, no such organization exists to protect the copper industry. After many years of prosperity, a comparatively small excess of production over demand caused the price of the metal to fall from the exceptionally high levels of 1956 to £180 per ton by December, 1957, and to £160 per ton in March of this year. This is a level at which, in the long run, the world's requirements of copper cannot be profitably produced. In an endeavour to meet the situation, most of the leading producers throughout the world decided to reduce production.

In common with other African pro-

ducers we decided to cut the Group's production by 10 per cent, or a total of 27,000 tons. It seemed to us that our objective must be to cut expensive production, not to cut all mines *pro rata* to their production. We therefore arranged to cease production at Bancroft for one year, but to increase production slightly at Nchanga and Rhokana, thus achieving an overall curtailment of 27,000 tons.

During this period development will be concentrated at the No. 1 Shaft area of Bancroft, and we anticipate that the mine will be able to resume production at costs comparable with those of other mines on the Copperbelt. In due course Bancroft will take its place as one of the great copper mines of the world. Meanwhile, at Rhokana and Nchanga everything possible is being done to reduce costs to a minimum.

Additional stability and strength have been given the Corporation as a result of our offer made to ordinary stockholders in African and European Investment Company Limited last December to purchase their stock. The offer was widely accepted and African and European, which for some years had been closely associated with us, is now owned as to 87 per cent by our Corporation. Apart from increasing our total assets and our investment in first-class gold mines, the acceptance of the offer has resulted in a large increase in our stake in the South African coal industry.

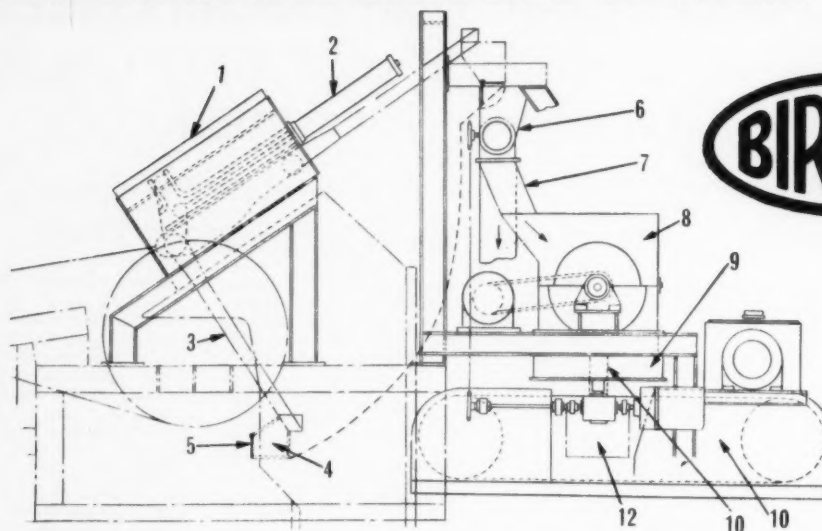
At the same time as our offer to African and European ordinary stockholders, the Corporation over the year-end raised £6,000,000 by an issue of convertible notes, which has put us into a sound position to follow our policy of expansion when opportunities arise. This policy includes the acquisition and development of interests outside our primary sphere of mining.

Faith in South Africa

Up to the day of his death, my father continued to direct the affairs of the Corporation with the same ability, energy and optimism which characterized his entire career. Only last year he said in a message on his seventy-seventh birthday: "I am confident that the next fifty years will see progress in South Africa just as spectacular as I have seen in the fifty or more years that I have been a South African."

I share my father's confidence, and I believe that Anglo American Corporation will take its rightful place in the progress he foresaw. In doing so, our policy will remain, as my father stated it in 1954, "to earn profits, but to earn them in such a way as to make a real and permanent contribution to the well-being of the people and to the development of Southern Africa."

COMPREHENSIVE SAMPLING SYSTEMS



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- 1 Guide Box*
- 2 Hydraulic Cylinder*
- 3 Swinging Arm*
- 4 Bucket*
- 5 Hinged Door*
- 6 Discharge Hopper with Worm—
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- 7 Removable chute
- 8 Crusher
- 9 Rotary plate-feeder
- 10 Discharge chute from
rotary feeder
- 11 Slotted belt type
secondary sampler
- 12 Container for final sample

* Primary Sampler Component

The obtaining of a representative sample of a bulk material is a requirement frequently encountered in many industries. Birtley sampling systems have been developed to meet this need and form a compact installation in which the final sample, of proportions suitable for the laboratory, is obtained automatically at the initial sampling point, all reject material from the sampling process being returned directly to the main material stream.

The diagrammatic layout shows a typical Birtley primary and secondary sampling system on the head end of a conveyor. Crushing and secondary equipment is required to cater for the larger particle sizes and tonnages but for the lighter duty plants a primary-only system may suffice to meet sampling requirements.



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THE CENTRAL PROVINCES MANGANESE ORE

RESULTS AGAIN SHOW IMPROVEMENT

MINES IN SATISFACTORY CONDITION

MAJOR A. C. HERRING ON CURRENT AND FUTURE OUTLOOK

The 50th annual general meeting of the Central Provinces Manganese Ore Company Limited was held on June 13 at Winchester House, Old Broad Street, London, E.C.2. **Major A. C. Herring, V.C., A.C.A.** (the Chairman), presiding.

Mr. T. D. de Deney, F.C.I.S. (the Secretary), read the notice convening the meeting and the report of the auditors.

The chairman said: Ladies and Gentlemen,

The Report and Accounts for the year ended December 31, 1957, have been in your hands for some time and, with your permission, I will take them as read.

Tribute to Mr. H. R. Holmes

Shareholders will have seen from the Report that Mr. Holmes has retired from the position of Chairman and that I have taken over that responsibility. This took place in August last at his request, but I feel I should be lacking in my duty if I did not give you some idea of the outstanding work which he has done for this Company. Mr. Holmes joined the Company in 1905 and after 17 years in India, where he was for some time the Company's Agent and General Manager, he came to the Head Office in London as Managing Director and later became Chairman. He has served the Company in all for some 53 years and held the position of Chairman for 13 years. I have been a Director now for some 20 years and during that period it has been my pleasure to meet him at the office most days of the week. I therefore know him very well and I wish to say that in my opinion no Company has ever had a more devoted servant, and that it is largely due to his untiring efforts that the Company has had such a successful history and is held in such high regard. Although he has retired as Chairman, it is a source of great satisfaction that he remains on the Board and is still at the office most days of the week. We therefore still have the benefit of his knowledge and advice, and I only hope that we have relieved him to some extent from his former heavy responsibilities.

A Satisfactory Year

From an examination of the Accounts you will have gathered that the year 1957 was a satisfactory one. The balance on trading for the year is £3,046,635 as compared with £1,695,935 for 1956, and on this occasion the Trading Profit is arrived at after transferring £200,000 to Ore Stock Reserve. The total value of our stock at December 31, 1957, showed an increase of some £400,000 to the figure of £2,120,820. I may say that the tonnage in hand was very similar to that held at December 31, 1956, the increase in book value being due to two factors—firstly, a somewhat higher cost of production; and secondly, a larger proportion of our stock being at port at the end of 1957 had therefore to bear the cost of transport from the Mines. In view of this increase in book value, we have thought it prudent to increase our Ore Stock Reserve by £200,000 to £700,000.

The only other item which calls for comment in the Profit and Loss Account is the small charge of Indian Estate Duty £3,401. By 1956 there was an accumulation of £42,091 for Indian Estate Duty which was not charged against Profits,

but was deducted from our Contingencies Reserve, which to some extent had been provided for this purpose. Under the provisions of the Estate Duty (Amendment) Bill, 1958, it would appear that in the course of two or three years there should be no further liability accruing to the Company for Indian Estate Duty.

Balance Sheet Features

Turning to the Balance Sheet, you will notice that we no longer hold any Shares in the United Kingdom Ferro Manganese Company Limited. In his speech in June last, the Chairman mentioned that in the early months of the year we had disposed of these Shares.

We have been advised that it would be in the best interests of all concerned if the Staff Benefit Fund was transferred to a Staff Benefit Trust with independent Trustees. This has been done.

Our cash and gilt-edged investments together total £2,190,521, being an increase on the year of £1,170,320. This no doubt sounds very satisfactory, but it should not be overlooked that our Reserve for Future Taxation amounts to £1,334,000, an increase of £720,000 over the previous year. The net profit for the year after providing for taxation £1,925,000, depreciation, etc., comes out at £1,010,345, compared with £451,756 for 1956. The Directors propose that of this amount £100,000 be transferred to General Reserve and that £250,000 be transferred to Mines Development. During recent years a great deal of money has been spent on the equipment and the development of the Mines, and this course we intend to pursue so that we may be able to meet any likely demands for Ore which may be made upon us. This expenditure we plan to finance out of our accumulated resources.

An Interim Dividend has already been paid of 1s. 2d. per unit, free of tax, and it is now proposed that there should be a Final Dividend of 1s. 8d. per unit and a Bonus of 1s. 4d. per unit, both free of income tax. This will absorb £625,000, leaving £313,537 to be carried forward as compared with £281,197 brought in.

I have no doubt that many of you are wondering whether we shall benefit materially from the change which has been made as regards Profits Tax. I regret to say that the benefit which we may derive will be insignificant owing to the fact that Indian Taxation is very high and practically all our taxes accrue to India.

Baseless Rumours

During the latter months of 1957 and early in this year there were many rumours prevalent in India as regards take-over bids for the Shares of the Company, and as these rumours might have created an air of uncertainty and so damaged our relations with our customers and indeed with the Indian Government, we inserted a notice both in the English and Indian Press stating that no negotiations were taking place in this connection and that any suggestion that the Board was seeking a change of ownership of the Company was entirely without foundation. We hope that anybody who may have heard these rumours will now appreciate they are baseless.

Mr. Hardy, one of our Joint Managing

Directors, visited India in January, when he had important discussions with officials of the State Trading Corporation and other Central Government officials. I am glad to say that our relations with the different Authorities in India continue on a satisfactory basis.

Mr. Hardy also visited the Mines in India and submitted full and informative reports to the Board. I am pleased to say he found the mines in satisfactory condition.

Diamond Drilling Programme

Our Diamond Drilling programme has continued and drilling has taken place at Kandri, Ukwa, and Sitasongi Mines. This work has indicated considerable tonnages of good-quality ore at Kandri and Ukwa Mines.

We have recently been connected to the Government Electricity grid supply at our Balaghat Mine and we hope to hear shortly that a full supply has been made available at our Tirodi Mines. There has been considerable delay in the supply of power as we mentioned last year, but in the meantime we have been able to complete most of our construction work at these two mines. Shaft sinking was suspended at Balaghat Mine, whilst the permanent headgear was erected, and the two electric hoists are now available for work in Holmes Shaft, where sinking has been resumed.

We hope that the financial stringency in India will not prevent us from maintaining our equipment in good condition and in extending it wherever mechanized operations can be used successfully. We have drawn the attention of Government to the necessity of granting Import Licences expeditiously for essential equipment for our mines.

The increase in profits for 1957 was due entirely to the improved rail facilities which prevailed, and which we very much appreciated.

Prospects

As regards the prospects for the current year, the position is that at the end of December, 1957, the amount of ore at ports was quite satisfactory and railings this year up to the moment have continued to be good. Consequently it would be right to say we have made a good start, but on the other hand we cannot overlook the fact that the Steel Industry of the United States is passing through a difficult period. How long this will last and how far it may spread, we cannot tell, but there are definite signs that the demand for our Ore during the coming months of this year will not be as heavy as usual. Should the position deteriorate no further, I trust that the results for 1958 will not be found unsatisfactory. Looking further ahead, 1959 must depend upon the activity of the Steel Industry generally and competition which may arise from new sources of supply. However, our mines are in good shape, our ore has an excellent reputation, we have a very good and long-standing connection with the principal buyers in the United Kingdom and the United States of America and our relations with the State Trading Corporation of India—with whom we are working in close co-operation—are very good; consequently I feel that we can look to the future without undue apprehension.

Tributes

I am sure you will wish me to express our thanks to all our staff at home and in India, also our shipping agents in India, Messrs. James Finlay & Co. Ltd.,

for their loyal and continued efforts on behalf of the Company.

In particular, in a business such as ours, success depends to a large extent on the ability and integrity of all our engineers actually on the spot at the Mines. We are fortunate in the men whom we have and who have carried out their duties very efficiently. I am also glad to report that our relations with our Trade Union and with our labour generally remained satisfactory throughout the year. For them we have provided a scheme of retirement gratuities in addition to our other Welfare activities.

I personally would like to thank my colleagues on the Board for their never-failing co-operation.

I now beg to move: "That the Report of the Directors and Statement of Accounts as at December 31, 1957, be and are hereby approved and adopted and that the profits be appropriated as recommended by the Directors." I will ask Mr. Holmes to second the Motion, and before putting it to the Meeting I will endeavour to deal with any questions which Stockholders may wish to ask.

Mr. H. R. Holmes seconded the resolution, which was carried unanimously.

The Board's proposal of a final dividend of 1s. 8d. per unit, free of tax, and a bonus of 1s. 4d. per unit, free of tax, was also approved.

The retiring director, Mr. H. R. Holmes, was re-elected, and the remuneration of the auditors, Messrs. W. A. Browne & Co., having been fixed, the proceedings terminated with a vote of thanks to the Chairman, Directors, and Staff at home and abroad.

SOUTH CROFTY, LTD.

The fifty-second annual general meeting of South Crofty, Ltd., was held on June 18, in London.

Mr. T. Pryor, D.S.O., M.I.M.M., Chairman, presided, and the following is an extract from his Statement circulated with the Report and Accounts for the year ended December 31, 1957:—

The Board have appointed Mr. A. Leonard Thomas, A.C.S.M., A.M.I.M.M., a Director and Managing Director of the Company. He is well acquainted with Cornish mining conditions.

Improved ventilation is apparent in the mine since the South Crofty workings at the 340 fm. level have been connected to the 1,900 ft. level east from Roskear Circular Shaft.

The ore reserves above the bottom level of South Crofty are sufficient to supply the enlarged mill with ore for three years, and there are large areas of potentially valuable ground awaiting exploration above this level. By deepening Cook's Kitchen Shaft further supplies of ore can be opened up for a long period ahead.

The total expenditure to the end of 1957 on the re-organization of the treatment plant and the erection of the new heavy-media-separation plant at South Crofty has been £106,481.

The work has been financed by the £100,000 Debenture Loan negotiated in 1955. The cash resources of the Company were nearly exhausted by March, 1958. In February, 1958, the Debenture Holders agreed to lend a further £17,000 on similar terms to the original £100,000. Discussions are proceeding regarding further finance.

The report and accounts were adopted.

BRITISH-BORNEO PETROLEUM SYNDICATE

EMINENTLY SATISFACTORY RESULTS

The forty-fourth annual general meeting of British-Borneo Petroleum Syndicate Limited was held on June 11 in London.

Mr. Campbell L. Nelson (the Chairman) presided and, in the course of his speech, said:—

The revenue for the year amounted to £389,000, a record for the Company. The royalty from Brunei oil production is again the largest contributor to our revenue, but our other sources of income, mainly dividends and interest, have become substantial and, as I mentioned to you last year, reflect our policy of retaining in the business a sizeable part of our profits, and reinvesting them mainly in Oil and Mining Companies. Our net addition to investments during the year under review amounted to £82,000. The Brunei Royalty showed a modest reduction on the previous year but this has been more than compensated for by a larger income from our other sources.

Expenses were £18,000 whilst taxation was £210,000. This left us with a net profit for the year of £161,000. We now recommend the payment of Dividend No. 50 of 1s. 7d. free of Income Tax per unit of Stock, which will take £105,000. This is the ninth year in succession in which we have been able to recommend an increase in the rate of dividend.

Our oil interests in British Borneo consist of the right to receive a royalty on all oil production of Brunei Shell Petroleum Company—a member of the Shell Group—in the State of Brunei and on any oil production which may be obtained in the Klias Peninsula in British North Borneo. The active development

and production programme of the Brunei Shell Petroleum Company in its Seria Field in Brunei has been maintained and we may expect that our royalty will continue to be substantial.

Portfolio of Investments

The greater part of our Quoted Investments remains in the Oil Industry which, despite difficulties of world wide over-production, has continued its growth and prosperity. Our oil investments include holdings in Apex (Trinidad), British Petroleum, Burmah Oil, Canadian Eagle and Shell which are well equipped to withstand temporary setbacks and to participate in the bright prospect which I am confident lies before the industry. In addition, in recent years, we have built up a promising portfolio of investments in Mining Companies which include West Driefontein Gold Mining, Doornfontein Gold Mining, Western Holdings, Harmony Gold Mining, International Nickel and N'Changa Copper.

The Stock Exchange value of our investments is substantially in excess of the amount at which they are included in the Balance Sheet.

Members will, I think, agree that the results for the year under review are satisfactory. Profits have steadily increased over the years and so have dividends. At the same time we have made substantial additions to our investments and have built up a strong financial position which has stood us in good stead. We are confident that there are favourable opportunities ahead for further profitable business.

The report and accounts were adopted.

LONDON METAL AND ORE PRICES, JUNE 19, 1958

METAL PRICES

Aluminium, 99.5%, £180 per ton	Iridium, £22 oz. nom.
Antimony—	Lanthanum (98/99%) 15s. per gram.
English (99%) delivered, 10 cwt. and over £190 per ton	Manganese Metal (96% - 98%) £310
Crude (70%) £190 per ton	Magnesium, 2s. 5½d. lb.
Ore (60%) basis 19s. 6d./20s. 6d. nom. per unit, c.i.f.	Nickel, 99.5% (home trade) £600 per ton
Arsenic, £400 per ton	Osmium, £18 oz. nom.
Bismuth (min. 1 ton lots) 16s. lb. nom.	Osmiridium, nom.
Cadmium 10s. 0d. lb.	Palladium, £6 5s./£6 15s.
Cerium (99% net), £16 0s. lb. delivered U.K.	Platinum U.K. and Empire Refined £24/£25 oz.
Chromium, Cr. 99% 7s. 2d. lb.	Imported £20 15s./£21 15s.
Cobalt, 16s. lb.	Quicksilver, £76 10s. ex-warehouse nom.
Germanium, 99.99% Ge. kilo lots 2s. 8d. per gram	Rhodium, £40/£42 oz.
Gold, 249s. 11½d.	Ruthenium, £14/£16 oz. nom.
	Selenium, 50s. 0d. per lb.
	Silver, 74½d. f. oz. spot and 74½d. f.d.
	Tellurium, 14s./15s. lb.

ORES AND OXIDES

Bismuth	65% 8s. 6d. lb. c.i.f.
	18/20% 1s. 3d. lb. c.i.f.
Chrome Ore— (Fe ratio 3:1)	
Rhodesian Metallurgical (semifriable) 48%	£16 5s. 0d. per ton c.i.f.
Hard Lumpy 45%	£16 0s. 0d. per ton c.i.f.
Refractory 40%	£11 10s. 0d. per ton c.i.f.
Smalls 44%	£14 10s. 0d. per ton c.i.f.
Baluchistan 48%	£11 15s. 0d. per ton f.o.b.
Columbite, 65% combined oxides, high grade	nom.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF ₂)	156s. 0d. ex works
Lithium Ore—	
Petalite min. 34% Li ₂ O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Lepidolite min. 34% Li ₂ O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Amblygonite basis 7% Li ₂ O	£26 3s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£22 0s. d/d
Manganese Ore Indian—	
Europe (46% - 48%) basis 67s. 6d. freight	nom.
Manganese Ore (43% - 45%)	nom.
Manganese Ore (38% - 40%)	nom.
Molybdenite (85% basis)	8s. 5d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO ₂ (prompt delivery)	£35/£36 per ton c.i.f. Aust'n
Ilmenite 52/54% TiO ₂	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	75s. 0d./78s. 0d. per unit c.i.f.
Vanadium—	
Fused oxide 90 - 95% V ₂ O ₅	£10 per unit c.i.f.
Zircon Sand (Australian) (65 - 66% ZrO ₂)	£14 5s. per ton c.i.f.

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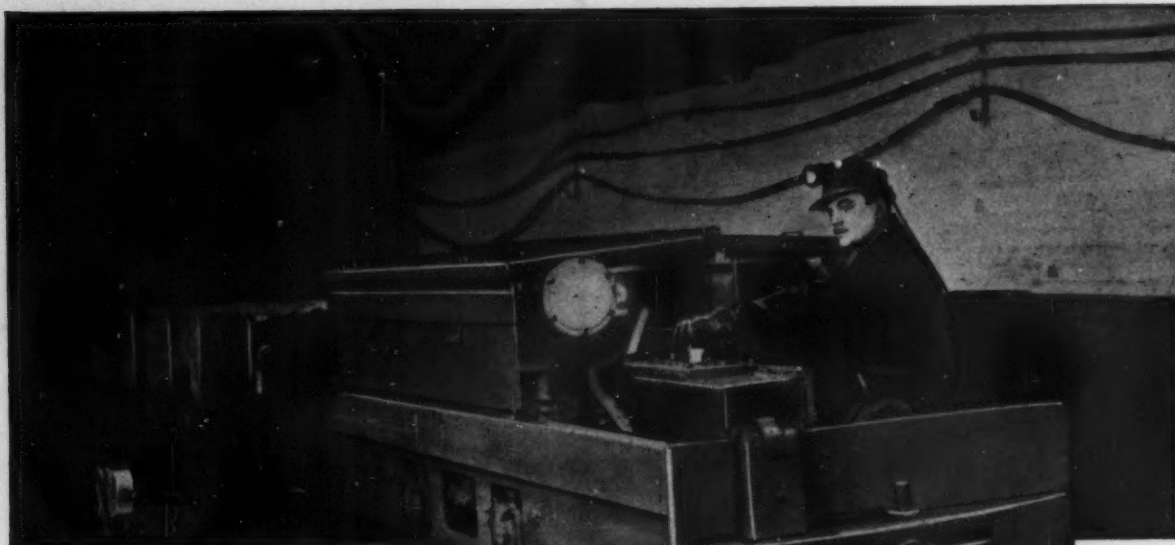
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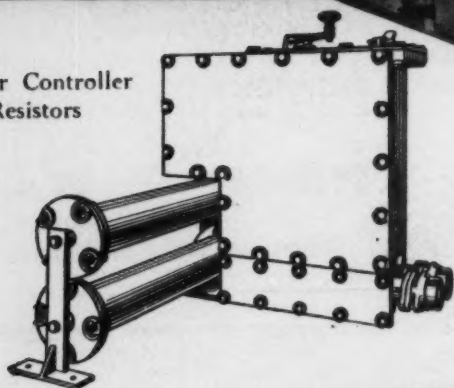
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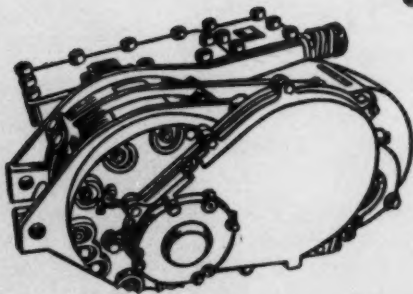
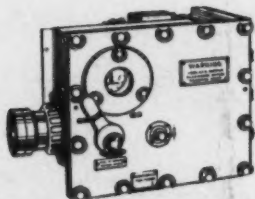
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